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ABSTRACT

This volume contains the Research Consortium research abstracts which were accepted for presentation at the annual convention of the American Alliance for Health, Physical Education, Recreation and Dance in Houston (Texas), April 23-27, 1982. Included for each abstract are the name and address of the presenter and the day and time of presentation. The abstracts are grouped according to topic: (1) dance; (2) growth and development; (3) biomechanics; (4) activities for special populations; (5) history and philosophy; (6) health; (7) motor learning and control; (8) psychology; (9) physiology; (10) measurement and evaluation; (11) pedagogy; (12) sociology; and (13) recreation. An author index is included. (FG)

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ABSTRACTS

of Research Papers 1982

Presented at the Houston, Texas Convention of the
American Alliance for Health,
Physical Education, Recreation and Dance
in the Research Consortium Meetings

SP 020 141

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AAHPERD

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Purposes of the American Alliance For Health, Physical Education, Recreation and Dance

The American Alliance is an educational organization, structured for the purposes of supporting, encouraging, and providing assistance to member groups and their personnel throughout the nation as they seek to initiate, develop, and conduct programs in health, leisure, and movement-related activities for the enrichment of human life.

Alliance objectives include:

1. Professional growth and development – to support, encourage, and provide guidance in the development and conduct of programs in health, leisure, and movement-related activities which are based on the needs, interests, and inherent capacities of the individual in today's society.
2. Communication – to facilitate public and professional understanding and appreciation of the importance and value of health, leisure, and movement-related activities as they contribute toward human well-being.
3. Research – to encourage and facilitate research which will enrich the depth and scope of health, leisure, and movement-related activities; and to disseminate the findings to the profession and other interested and concerned publics.
4. Standards and guidelines – to further the continuous development and evaluation of standards within the profession for personnel and programs in health, leisure, and movement-related activities.
5. Public affairs – to coordinate and administer a planned program of professional, public, and governmental relations that will improve education in areas of health, leisure, and movement-related activities.
6. To conduct such other activities as shall be approved by the Board of Governors and the Alliance Assembly, provided that the Alliance shall not engage in any activity which would be inconsistent with the status of an educational and charitable organization as defined in Section 501(c) (3) of the Internal Revenue Code of 1954 or any successor provision thereto, and none of the said purposes shall at any time be deemed or construed to be purposes other than the public benefit purposes and objectives consistent with such educational and charitable status.

Bylaws, Article III

PREFACE

This volume contains all Research Consortium research abstracts which were accepted for presentation at the Houston, Texas Convention of the American Alliance for Health, Physical Education, Recreation and Dance, April 23-27, 1982.

Space was made available in Houston for 155 research presentations and 14 symposia. A total of 316 research abstracts and 23 symposium proposals were received and critically reviewed. Approximately 50 percent of the research papers and 60 percent of the symposia were accepted. It should be obvious that the competition was rigorous. This competition and the quality outcome are a healthy sign for AAHPERD and its annual research program. It is not possible for a large multidisciplined organization to compete with smaller, more narrowly focused conventions but, on the other hand, in no other place can one be exposed to "state of the art" research covering the entire spectrum of AAHPERD disciplines.

For the first time the Research Consortium free paper sections utilize the section titles of the Research Quarterly for Exercise and Sport. Such a change has resulted in one-third more free paper sessions (27 vs. 18); however, each session is generally shorter and more specifically focused.

Results of 36 research projects are contained in four poster sessions. Such a mechanism enables more personal interaction between the investigator and interested colleagues.

The abstracts in this volume are grouped by topic and presented chronologically as the papers were reported during the convention. Actual presentation dates and times are noted on each abstract. For further information about individual papers, contact the person listed in the lower right corner of the abstract.

Many thanks to the authors whose research efforts provided the content of the Research Consortium program, to the reviewers who insured a quality product, and to the presiders who directed the sessions.

Bruce J. Noble
President-Elect, Research Consortium
Department of Health and Physical
Education
University of Wyoming
Laramie, Wyoming

REVIEWERS OF ABSTRACTS

The following colleagues served as reviewers of abstracts submitted for presentation at the 1982 AAHPERD Convention. Their volunteer effort, accomplished with great inconvenience to the reviewers, made a tremendous contribution to the Research Consortium. Without their professional peer review, the quality research reporting we desire could not be achieved. We salute the reviewers for their contribution and thank them for their extraordinary effort on our behalf.

Linda L. Bain, University of Houston
Steven N. Blair, University of South Carolina
Robert W. Christina, Pennsylvania State University
Priscilla M. Clarkson, University of Massachusetts
Kirk J. Cureton, University of Georgia
James Disch, Rice University
Diana R. Dunn, University of Arizona
John M. Dunn, Oregon State University
Deborah L. Feltz, Michigan State University
Susan L. Greendorfer, University of Illinois at Urbana-Champaign
Emily Haymes, Florida State University
Daniel M. Landers, Arizona State University
Aileene S. Lockhart, Texas Woman's University
Kenneth F. Metz, University of Pittsburgh
Richard C. Nelson, Pennsylvania State University
Roberta J. Park, University of California, Berkeley
Russell R. Pate, University of South Carolina
Vern Seefeldt, Michigan State University
Josie Sifft, University of Wyoming
Waneen Wyrick Spirduso, University of Texas-Austin
Craig A. Wrisberg, University of Tennessee
Beverly J. Yerg, Florida State University

B.J.N.

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*Session Presider

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AN AESTHETIC LOOK AT MODERN ART AND MODERN DANCE. Vera Lundahl, University of Nebraska at Omaha

The purpose of this study was to explore the elements in form that modern art and modern dance have in common. Specifically, the researcher sought out artists of sculpture and painting and contemporary modern dancers (from the period of 1930-present) and made a comparison of their works in terms of shape, line, color, rhythm, balance, and texture. Colored slides of specific sculpture, painting, and dance were prepared to illustrate the study. It was concluded that visual images of both modern art and modern dance are uniquely similar and that the ingredients in a work of art are not only perceived as a physical thing but are also seen aesthetically by the human being viewing them, influenced by his or her own experience and education.

Vera Lundahl
School of Health, P.E. and Rec.
University of Nebr. at Omaha
Omaha, Nebraska 68182

April 23, 1982
8:45 a.m.

AN ANALYSIS OF TWO IMAGES RELATED TO FOOT POSITIONING USED IN DANCE TRAINING.

Hannah C. Wiley, Five College Dance Department (Mount Holyoke College campus)

As progress is made in dance anatomical and kinesiological research, a need emerges for dance teachers to incorporate new information into their teaching. In this study, two images used in traditional dance teaching methodology, and referred to in popular dance anatomical and kinesiological references, are analyzed and compared to recent dance and non-dance-oriented literature; the images are 1) "while standing in first position, keep the body's weight over the balls of the feet," and 2) "while standing in first position, place the body's weight over three points in the foot (the heel, great toe and little toe) as on a tripod." Comparative research indicates that the first image may cause:increased instability; unnecessary tension, which may lead to injury, in the foot's fascia and musculature; undue stress on the metatarsals, which are not designed to bear weight by themselves; shortening of the Achilles tendon; and other maladies, contingent on foot configuration. In terms of the "tripod" image, non-dance anatomical literature emphasizes that the foot, in fact, does not act as a tripod because all the metatarsal heads bear weight. Use of this image in teaching may lead to ambiguity in the location of the foot's axial line of balance, and therefore, in how to use the foot in balance control; and, to an increased tendency to evert the foot while standing flat (which also may lead to supination in relevé) that may cause damage to the foot, ankle and knee. Alternative imagery should emphasize distribution of body weight over the entire foot and awareness of the foot's axial line of balance. Further study should include analysis of the effect that these two images may have on the total body structure and alignment, and extensive comparative analysis between extant dance pedagogical imagery and current anatomical and kinesiological findings.

Hannah C. Wiley
Kendall Hall
Mount Holyoke College
South Hadley, MA 01075

April 23, 1982
9:00 a.m.

RELATIONSHIP OF CLASS RANK TO AGE, GENDER AND NUMBER OF YEARS IN DANCE TRAINING: Arlene Hellerman and Margaret Skrinar, Five College Dance Department (Hampshire College Campus)

Fifty-six advanced college dance majors were ranked according to technical skill in jazz, ballet and modern dance by their respective teachers in each idiom. Subjects provided data on age, gender and years in dance training. An ANOVA of the mean differences between quartile rank and age, years of training and gender was significant ($p=.05$). A means analysis indicated that rank and age were inversely related. Mean age for all dancers =20.63 years; from upper to lower quartiles, mean ages were 19.48, 20.18, 21.29 and 21.75 respectively. The results indicate that females trained longer than males ($\bar{X}=9.39$ yrs, $\bar{X}=3.24$ yrs) and that younger students are ranked higher than older students. Inspection of the raw data suggested a trend which indicated that years in training may be inversely related to rank. Statistical analysis failed to substantiate this impression. These findings suggest that more highly skilled dancers may be leaving the college dance department before completing the program. Further research is needed to determine: 1) if these results would be substantiated in other college dance departments, 2) what changes in college dance curriculum may be needed in order to further facilitate the professional development of all students involved in a given program, 3) how gender differences may effect the rate at which a dancer progresses and 4) if and why there appears to be no consistent relationship demonstrated between number of years in dance training and technical proficiency.

Arlene Hellerman
Five College Dance Department
Hampshire College
Amherst, MA

April 23, 1982
9:15 a.m.

COMPARISON OF SUPPORT BASE USE IN TWO DANCE TECHNIQUES:

Margaret Gray and Margaret Skrinar, Five College Dance Department
(Smith College Campus)

The qualitative distinction between ballet as ethereal and modern dance as earthy has long been accepted but not widely studied. As an indication of these qualities, use of gravity in ballet and modern college technique classes was indirectly studied by observation of support base use while dancing. The purpose was to gain information on whether ballet and modern techniques display fundamental differences in use of support bases. Equal numbers of ballet and modern technique classes at three levels were observed (6 beginning, 4 intermediate, 2 advanced) from eight instructors in the Five College Dance Department. An observation instrument was developed and validated ($r=.98$) which identified six bases of support according to relative floor area. A representative frequency for each base was determined by recording the particular base in use every fifteen seconds throughout class. A chi square revealed significant differences in support base use during warm-up: narrow bases are used 44% in ballet, 16% in modern; wide, grounded bases are used 49% in modern, 7% in ballet ($\alpha=.01$). During the second portion of class ("dancing" phase) no significant differences were observed between ballet and modern in support base use. There is need for further study in order to determine (1) whether these results would be supported by a similar study with a larger sample size which includes professional level classes, (2) what relationships exist between technique classes and performed dance, (3) whether warm-up in a technique class is keeping pace with the development of contemporary dance. In terms of support base use, this study provides measured evidence that there exist inherent similarities along with the fundamental differences between the practice of ballet and modern techniques. It may be only in reference to warm-up exercises that there is validity to the statement that "ballet is ethereal and modern more earthy."

Margaret Gray
Five College Dance Department
Smith College
Northampton, MA 01065

April 23, 1982
9:35 a.m.

CREATIVE THINKING ABILITY OF MODERN AND CLASSICAL DANCERS AT THREE LEVELS OF TRAINING.

Margaret Skrinar; Nancy H. Zelonka,
University of Pittsburgh

The developmental effects of dance training on creative thinking ability of ballet and modern dancers at beginning, intermediate and professional levels were examined. Sixty-five adult dancers fell into one of five groups according to the idiom and level of dance preparation: professional members of an NEA/DTP ballet company (PBD, 9 females, 6 males); professional members of two NEA/DTP modern companies (PMD, 8 females, 3 males); non-professional intermediate modern dancers working 15-25 hours/week in dance (NPMD, 13 females); beginning ballet students with no more than 4 weeks training (BBD, 14 females): and beginning modern students with no more than 4 weeks training (BMD, 12 females). Subjects were given the standardized Torrance Test of Creative Thinking Ability, Figural Form A. Each test was scored for the factors of originality, elaboration, fluency, and flexibility. All group means for each factor were within one standard deviation of the population means established for the test with the following exceptions: Female NPMD and PBD one s below $\bar{X}$ for fluency; female PBD and PMD one s below $\bar{X}$ for elaboration; female PBD one s below $\bar{X}$ for originality; female PMD one s above $\bar{X}$ for originality. It appears that contrary to the dance literature, modern and ballet dance training may generally have no positive effect and perhaps negatively influences creative thinking especially in female professional ballet dancers. The exception, originality, may be well developed in female professional modern dancers.

Margaret Skrinar
Five College Dance Department
Mount Holyoke College
South Hadley, MA 01075

April 23, 1982
9:45 a.m.

DEVELOPING COINCIDENT TIMING SKILL IN CHILDREN: A COMPARISON OF TRAINING METHODS. Craig A. Wrisberg and Barbara J. Mead, University of Tennessee, Knoxville

The present study attempted to determine whether the nature of training experiences influences the development of coincident timing skill in young children. The task involved visual tracking of a moving light sequence and a 43 cm arm movement to a padded target. Subjects attempted to tap the target coincident with the completion of the light sequence. Sixty first grade children were randomly assigned to one of five groups, with an equal number of males and females in each group. Subjects assigned to the training groups received 48 trials on each of two days with stimulus speeds that were either slow (179 cm/sec), fast (313 cm/sec), varied-random (179, 224, 268, 313 cm/sec), or varied-blocked (i.e., 6 consecutive trials with one speed before changing to another). Control subjects performed a neutral coloring activity during the training phase of the experiment. All subjects were then given 10 trials on a third day with each of two stimulus speeds not experienced previously: one slow (134 cm/sec) and one fast (402 cm/sec). During transfer trials all groups were more accurate with the fast than with the slow speed stimulus. Training method mattered most during slow speed transfer trials with the most accurate performance demonstrated by the group receiving varied-blocked speeds during training. The least effective methods were fast-speed training, especially for males, and varied-random speed training. It was concluded that training sessions for the development of coincident timing skill in young children should emphasize slower speed stimuli and blocking of additional speeds which are more rapid.

Dr. Craig A. Wrisberg
School of HPER
University of Tennessee
Knoxville, TN 37916

April 23, 1982
10:15 a.m.

DEVELOPMENT OF MOTOR PROFICIENCY FACTORS THROUGH CHILDHOOD.

Geoffrey D. Broadhead, Louisiana State University, Baton Rouge;
Robert H. Bruininks, University of Minnesota

The purpose of this study was to examine the structure of gross and fine motor proficiency of boys and girls to see if differences were apparent through the childhood years. The raw data from the original national sample used to standardize the Short Form of the Bruininks-Oseretsky Test of Motor Proficiency (BOT) was divided by sex and into ten chronological age (CA) groups, ranging from 5-14 years. For each sex by CA group, the intercorrelation matrix was subjected to three factor solutions to which both orthogonal and oblique rotations were applied. Loadings of 0.40 and higher, for at least four of the six solutions, indicated consistency sufficient to identify comparable common (CCF), and comparable specific (CSF), factors. In most cases the four to six factors initially extracted were robust with respect to method. However, with the older CA groups there was a greater number of CSFs. Only marginal differences between the factor structures for boys and girls, or across CA, were noted. The composition of the CCFs was not always in line with the structure originally hypothesized for the Long Form of the BOT. However, the consistency of a number of separate gross and fine factors across the CA range appears to support the use of the Short Form as a useful screening instrument.

Geoffrey D. Broadhead
School of HPERD
Louisiana State University
Baton Rouge, Louisiana 70803

April 23, 1982

10:30 a.m.

HORIZONTAL STRUCTURE IN THE DEVELOPMENT OF MOTOR SKILLS.

Stephen Langendorfer, Kent State University

There is ample evidence to support a claim for "vertical structure" (development sequences defined by invariant order across time) in the development of motor skills. Developmental stage theory also requires proof of "horizontal structure" (within time, across task similarities in levels of developmental sequences) in order to label developmental changes as "stage-like". The present investigation was designed as a "pre-longitudinal screening" study to inquire whether sufficient across task generality (horizontal structure) exists between developmental levels of motor tasks to support the claim for stages in motor development. It was hypothesized that "movement components" (trunk action, humerus action, forearm action, and stepping action) for two motor tasks would demonstrate either a synchronous (exact within-time, across task) agreement or a "decalage" (time lag) relationship. Using standardized cinematographic techniques, 58 male subjects, ages 1.25-10.33 years, were filmed while performing five trials each of forceful overarm throwing and forceful overarm striking (suspended ball). Two Milliken high speed cameras (Models DBM-45; -50: 25 mm Bell & Howell lens), set at right angles and 30' from the subjects, recorded each trial at a film speed of 64 fps. Both rear and side views were then projected simultaneously by Analyzer projectors in slowed- and stepped-action modes. The Roberton Component Category Checklists for the Overarm Throw were used to reduce the film data for both tasks into developmental levels. Several non-parametric procedures (including χ^2, and coefficient of contingency) were used to test whether the resulting across task relationships significantly differed from the two hypothesized patterns. Experiment wise Type I error rate was controlled at $\alpha = .10$. The results indicated no synchronous relationships across tasks for movement components. A significant "decalage" across task relationship, however, did exist for trunk action and humerus action components. Additionally, racquet action, a movement component unique to the striking task, showed the same significant "decalage" relationship to forearm action of the throwing task. The overall results at least partially support the existence of "horizontal structure" in the development of the motor tasks under study. Longitudinal study of these and other motor tasks is warranted. (Based on doctoral dissertation research at the University of Wisconsin-Madison under the director of Drs. Lolas Halverson and Mary Ann Roberton).

Stephen Langendorfer, Ass't. Dir.
Motor Development Center
School of P.E.R.D.
Kent State University, Kent, Ohio

April 23, 1982
10.45 a.m.

AGE DIFFERENCES IN STRATEGIES FOR PLANNING AND RECALLING PRESELECTED AND CONSTRAINED DISTANCES JOGGED.

Katherine T. Thomas and Jerry R. Thomas, Louisiana State University

This experiment investigated the effects of spontaneous or induced memory strategies upon recalling the distance jogged when the distance jogged was either preselected by the subject or constrained by the experimenter. Four groups of 10 subjects each were randomly formed at each of three age levels -- 7-, 11-, and 21- years. The factors were 2 levels of strategy (subjects cued to count steps or not), 2 levels of target distance (preselected or constrained), and three levels of length of job (short, medium, and long). Nine trials (3 at each length) were randomly ordered and administered within age level under the appropriate combination of the other two factors. The design was a 3 (age) x 2 (strategy) x 2 (pre-selected or constrained) factorial and MANOVA with appropriate follow-ups was done for the CE-VE combination. Separate ANOVAs were done for AE and CE. Results were quite consistent in showing Age x Strategy effects for AE, CE and VE. This interaction was created by a linear increase (as measured by improved accuracy and decreased variability) in the spontaneous use of strategy as age increased. But when the younger age groups were induced to use the step-counting strategy, recall for distance information was significantly improved over the non-induced (spontaneous) rehearsal groups. Adults did not differ by strategy groups, i.e., adults spontaneously use a counting strategy so inducing rehearsal is of minimum benefit. Subjects' preselection of the distance to jog was not significantly better than experimenter selection (constrained condition). Nor did preselection interact with age or strategy. Thus the perceptual judgement (CE) of distance as well as the strength of the memory trace (VE) for recall depend upon the appropriate use of a strategy regardless of whether the strategy is used spontaneously as with adults or is induced by the experimenter for younger children.

Katherine T. Thomas
Adapted Phy. Ed. Specialist
West Baton Rouge Schools
Port Allen, LA

April 23, 1982
11:00 a.m.

A KINEMATIC ANALYSIS OF THE SPRINTING GREYHOUND.

Russell L. Couturier, Springfield College

The purpose of this paper was to analyze the kinematic parameters essential to increased velocity in greyhound racing dogs. True body center of mass locations was directly verified from four frozen greyhound specimens. Each carcass was then dismembered into 14 independent segments. The proportional weights and center of mass locations of all segments were observed. The data were combined to estimate mean proportional weights and segment centers of mass for a population of greyhounds. Utilizing a procedure initiated by Dempster (1955), the researcher indirectly estimated the total body center of mass of the original specimens. A mean error of 5.3 percent was obtained when compared to the true body center of mass locations. Eight greyhounds were filmed in actual competition using high speed cinematography. A kinematic comparison was made between superior and moderate performers. Superior performers were greyhounds which placed either first or second in grade AA, A, or B races. Moderate performers were greyhounds which placed either seventh or eighth in grade B, C, or D races. Parameters within the kinematic analysis included: contact time, common contact time, flight time, stride rate, stride length, center of gravity oscillation, and placement of limbs relative to the center of mass location. Evidence from this study suggests that superior greyhounds are characterized by shorter flight times, associated with increased total contact times, and consequently, greater stride lengths. Conversely, moderate performers are characterized by increased flight times and greater vertical displacements of the center of mass. Resulting, is a decrease in total contact times, associated with shorter stride lengths. Other parameters within this study did not discriminate between superior and moderate performers.

Dempster, W.T. Space requirements for the seated operator. WADC Technical Report, Wright-Patterson Air Force Base, Ohio, 1955, 55, 1-110.

Russell L. Couturier
Springfield College
Springfield, MA 01109

April 23, 1982
11:30 a.m.

RELATIONSHIPS AMONG SELECTED KINETIC PARAMETERS, BAT VELOCITIES, AND THREE METHODS OF STRIDING BY FEMALE SOFTBALL PLAYERS.

S. Messier, Wake Forest University; M. Owen, Temple University

The purpose of this investigation was to examine the relationships among the lower extremity joint and muscle forces and moments, maximum linear bat velocities and three methods of striding by female softball batters. Using three distinct methods of striding (open, parallel and closed), eight females, who were currently playing amateur softball and were present or former intercollegiate softball players, batted against a belt-driven pitching machine which propelled softballs at a mean velocity of 23.69 m/s. High speed photography (100 fps) employing direct linear transformation methodology and a force platform were used to record the raw kinematic and kinetic data. The results were digitized and computer processed to determine the three dimensional components of the linear bat velocity and the lower extremity joint and muscle forces and moments. Hip, knee and ankle forces acting orthogonal to the plane of progression (F_o) were significantly ($p < .05$) greater when subjects utilized the closed striding method. This suggests that subjects had greater forward motion in the direction of home plate when the closed method was used. Left hip F_o values, which are associated with lateral stabilization of the left hip just prior to contact, were significantly less ($p < .05$) when subjects used the open striding method. This may be related, in part, to less lateral motion of the limb as the batter rotates forward. Compressive forces (F_v) were greater in the ankle joints than in the knee and hip joints. This reflects the additional weight being borne by the lower segments. As the subject shifted her weight forward in preparation to hit the ball, a rapid decrease in the right F_v, accompanied by an increase in the left F_v, reflected the unweighting that occurred. Significantly ($p < .05$) greater right horizontal hip and knee moments were found when subjects utilized the closed striding method. This appears appropriate since, if subjects are to properly execute the swing when the closed method is used, their lower extremity must rotate through a greater range of motion in approximately the same time period, hence, the association with greater horizontal muscle moments. However, a comparison of the components of the maximum linear bat velocity among striding methods did not reveal significant differences in magnitudes. This suggests that when female subjects utilize the closed striding method, the greater amount of muscular effort required to rotate forward does not result in a significant increase in bat velocity.

Stephen P. Messier
Dept. of Physical Education
Wake Forest University
Winston-Salem, NC 27109

April 23, 1982
11:45 a.m.

KINEMATIC COMPARISONS OF PATTERNS OF MOTION FOR SPRINT RUNNING AND HYDRAULIC WEIGHT TRAINING MACHINE EXERCISE. Frank I. Katch and Everett A. Harman, Department of Exercise Science, University of Massachusetts, Amherst, MA

Two hydraulic weight training exercise machines (Hydra Gym, Inc.) are recommended for improving muscular actions involved in sprint running. The "unilateral-knee" and "runner" machines provide hydraulic resistance to both extension and flexion of the knee and hip, respectively. To determine how closely exercise on the machines simulates patterns of leg and hip motions during actual sprint running, 10 male subjects (age 21.7 ± 2.2 yrs) were filmed with two cameras at the start and middle of a 40-meter dash, and during maximal force production during 10 repetitions of exercise on both machines. Digitization produced point coordinates used for computer assessment and curve plotting of joint angles and angular velocities. Range of motion on the knee machine was 10° greater in extension and 30° less in flexion than for the knee during sprint running. On the "runner" machines, hip range of motion was 20° less for extension but greater for flexion than during actual sprint running. There was little overlap in patterns of knee angular velocity between machine performance and the all-out sprint. Joint angular velocity during running was 2 to 5 times higher during sprinting than on the machines. Characteristic angular-velocity vs. joint angle patterns obtained during running were not matched on an equivalent basis by the machines. Both of the hydraulic exercise machines allow highest joint angular velocities at the extremes of flexion and extension. Factors that account for these findings include the compressibility of the machine's protective pads, the intrinsic properties of the conventional hydraulic cylinders, and the relationship between angular machine resistance arm motion to linear motion of the resistance cylinder rod.

Frank I. Katch
Department of Exercise Science
University of Massachusetts
Amherst, Massachusetts 01003

April 23, 1982
12:00 a.m.

ELECTROGONIOMETRIC EVALUATION OF KNEE BRACE INFLUENCES ON THE SURGICALLY REPAIRED KNEE DURING OVERGROUND RUNNING. Kathleen M. Knutzen, Western Washington University; Barry T. Bates, University of Oregon; Joseph Hamill, University of Oregon

Many participants in vigorous activity who sustain an anatomical disturbance of the knee through injury are fitted with knee appliances so that external support is provided. There is little research to document any alteration in knee kinematics provided by these orthoses. The purpose of this study was to compare the dynamic range of motion at the knee of two knee brace conditions. Six adult volunteers aged 22 to 28 were used as subjects. All subjects had a surgically repaired knee, a healthy contralateral knee, and were wearing the same type of derotation brace prescribed by their physician. Subjects ran through the experimental area at a slow running pace with the C.A.R.S.-U.B.C. electrogoniometer strapped to one limb. Three orthogonal potentiometers placed at the knee joint allowed the simultaneous collection of flexion-extension, inward and outward rotation, and varus-valgus motion parameters. The electrical signals from the electrogoniometer were fed directly to a Tektronix 4051 Graphics Calculator via an umbilical cord attached to a belt worn by the subject. Subjects completed five trials at each of four conditions, namely, healthy knee, surgically repaired knee, surgical knee fitted with an elastic support brace, and surgical knee fitted with a derotation brace. Computer analysis was conducted to determine tri-planar range of motion characteristics of the knee averaged over two completed leg cycles in each trial. Support time, swing time, flexion-extension range of motion in swing and support as well as tibial rotation parameters were examined. Results showed that the derotation brace had a general restraining effect on internal-external rotation of the surgically repaired knee. For all subjects, internal rotation was reduced by 22% and external rotation reduced by 31%. There was also an 11% reduction in the flexion-extension range of motion while subjects wore the derotation brace. The elastic support brace did not reduce any range of motion parameters. Additionally, the results revealed 5% greater flexion and extension in the non-surgical limb as compared to surgical limb, with no differences exhibited in total rotation values. These results suggest that certain knee appliances do reduce range of motion parameters at the knee during the act of running.

Kathleen M. Knutzen
Department of Physical Education
Western Washington University
Bellingham, WA 98225

April 23, 1982
12:15 a.m.

THE EFFECTS OF MOVEMENT UNCERTAINTY ON THE GROSS MOTOR REACTION AND MOVEMENT TIME OF MILDLY MENTALLY RETARDED CHILDREN.

Emily DiStefano, Louisiana State University; Denis Brunt, University of Texas

Environmental stimuli, as a source of movement uncertainty, affects reaction time (RT) and movement time (MT) on fine motor tasks. These effects may be exaggerated in mildly mentally retarded (MMR) children whose ability to attend to and process stimuli is known to be inferior. Of more practical importance is the support of such a notion on gross motor tasks. The purpose of this study, therefore, was to determine the effect of movement uncertainty on the RT and MT of MMR and normal children performing a simple running task. Female and male subjects (n = 69) were divided by chronological age (8 and 10) and group (MMR and normal) and completed a simple, choice and pre-cue condition. On the simple condition, subjects ran 4.6 m. Subjects completed the choice condition by running to one of three lights that was illuminated on reaching the 4.6 m mark. For the pre-cue condition subjects ran to one of only two lights. An age x group x condition design with repeated measures on the last factor analyzed subjects' performance for dependent measures of RT and MT on the 4.6 m run. For RT there was a significant group x condition interaction. MMR elicited a significantly inferior performance compared to normals on each of the three conditions. Within the MMR group an increase was found on the PC condition over the simple condition. For MT there was a significant group x condition interaction. MT of normals was constant throughout conditions, but MMR children showed a significant increase in choice and pre-cue conditions. MMR performance was significantly inferior to normal children in both the choice and pre-cue conditions. For MT 8 year old MMR elicited inferior performance compared to 10 year old MMR and 8 year old normal children, while there was no significant main effect for age for RT.

Emily DiStefano
13135 Briargrove
Baton Rouge, LA 70810

April 23, 1982
1:00 p.m.

INFLUENCE OF TEST SELECTION ON PHYSICAL EDUCATION PLACEMENT OF MENTALLY RETARDED CHILDREN. Geoffrey D. Broadhead and Gabie E. Church, Louisiana State University, Baton Rouge

While most mentally retarded (MR) children function adequately in regular physical education classes, some need an adapted program (APE). This APE exists at two levels in Louisiana; one for those with severe motor deficits and the other for very severe deficits. The question of matching a child's unique needs with a specific program placement should be addressed through objective assessment. Hence the focus of this study is on placement decisions which appear appropriate for the MR, using only motor performance data from two test batteries. The subjects (N=67, age=4-12 years) comprised two intact classes of ordinary children, one kindergarten and the other grade one, together with two self-contained special education classes, one for the mild MR and the other for moderate MR. Each child was individually administered both the Short Form of the Bruininks-Oseretsky Test of Motor Proficiency (BOT) and the Physical Dexterity (PD) tasks of the System of Multicultural Pluralistic Assessment. Using each vector of variables separately, discriminant analyses were completed to establish which class each child's motor performance was most like. For each analysis two of the three functions were significant ($p < .05$), accounting for 93% (BOT) and 97% (PD) of the variance, respectively. Overall correct classification was shown for between 65-75% of the children. Misclassifications for the MR indicated appropriate program placement to join others of similar motor performance. However, when the classification for each MR child was compared by test battery, contradictory placements were indicated for six of ten mild MR and three of eight moderate MR children. This emphasizes the importance of determining the specific evaluation question to be addressed and selecting the most appropriate instrument to assess that question.

Geoffrey D. Broadhead
School of HPERD
Louisiana State University
Baton Rouge, Louisiana 70803

April 23, 1982
1:15 p.m.

EFFECT OF PRIOR EXERCISE ON COGNITIVE PERFORMANCE TASKS IN HYPERACTIVE AND NORMAL BOYS. Diane H. Craft, New York University

The purpose of the study was to examine the tenability of exercise as one means of alterning arousal levels of children. The subjects, 62 boys, ranged in age from 7 to 10 years and had IQ scores above 80. Group 1 (Hyperactive) consisted of 31 subjects classified according to the Conners Abbreviated Teacher Rating Scale (CATRS) as hyperactive. Group 2 (Normal) consisted of the remaining subjects who, according to CATRS, were classified as normal. The study utilized a repeated measures design in which subjects were tested individually. Exercise involved pedaling a bicycle ergometer. To control for differences in fitness level the workload was adjusted based on each subject's PWC-170. On each of the four treatment days each subject pedaled for varying durations of time (0, 1, 5, and 10 minutes). The order of presentation was randomized across subjects. Immediately after exercising, each subject completed three measures of cognitive performance: Digit Span (WISC-R), Coding B (WISC-R), and Visual Sequential Memory (ITPA). Repeated measure ANOVAs were performed to determine if cognitive performance scores varied with exercise duration for each group. There were no significant differences found for either group. The results did not support the hypothesis that exercise affects cognitive performance in children. Davey's (1973) findings of an inverted U relationship between exercise and cognitive performance in adult subjects were not substantiated by this study. Nor did this study support the findings of Gutin (1968), Gutin and DiGennaro (1968), and Burgess (1964), who also identified significant relationships between exercise and cognitive performance using adults as subjects. However, this study's findings were consistent with findings of Flynn's (1972) study, the one similar study using children as subjects. It was suggested that adults' and children's cognitive performance may be affected differently by prior exercise.

Diane H. Craft
Prog. in Physical Educ. and Sport
New York University
New York, New York 10003

April 23, 1982
1:30 p.m.

THE STANDARDIZATION OF A CRT IN FUNDAMENTAL MOTOR AND PHYSICAL FITNESS SKILLS FOR HANDICAPPED AND NONHANDICAPPED STUDENTS. Dale A. Ulrich, Southern Illinois University

The objectives of this study were: 1) identify and standardize criterion-referenced test (CRT) items in the physical education domain based on the definition in Public Law 94-142; and 2) develop a set of norms for intellectually normal, educable mentally retarded, and trainable mentally retarded children in the age range of 36 months to 155 months. The three primary test functions identified to guide the test development process were 1) screening for identification of specific needs in physical education; 2) special education eligibility decisions; and 3) placement and instructional programming decisions. Three criteria were developed for the selection of specific skills within the locomotor, object control, and physical fitness skill areas. The criteria represented an effort to select skills that were relevant to the physical education content being taught in schools throughout the U.S. Sixteen skills were selected to be measured by the CRT. The study utilized 3 content experts to investigate content validity, descriptive validity, and criterion-selection validity. Two aspects of reliability were evaluated. The first indice studied was the internal consistency of the test using Cronbach's alpha coefficient and the second indice measured the test-retest stability. An alpha coefficient of .92 was obtained, resulting in acceptance of iter-item homogenity. A correlation coefficient of .97 was obtained for two separate test adminstrations of the total CRT. The collection of student performance data was used as a field test. The initial analysis of the student performance data consisted of computing a 3-way AOV to test for significant main effects (sex, age, and student classification) and interaction effects. Normative data were established by age and student classification. Student profiles were constructed to aid teachers in making nondiscriminatory decisions.

Dale A. Ulrich
Physical Education Department
Southern Illinois University
Carbondale, IL 62901

April 23, 1982
1:45 p.m.

THE ROLE OF WOMEN PHYSICAL EDUCATORS AND ORGANIZATIONS IN AMERICAN WOMEN'S STRUGGLE FOR THE OLYMPIC GOLD, 1922-1968.

Joan S. Hult, University of Maryland

The purpose of this study was to investigate the extent to which women physical educators and their organizations influenced the participation of American women athletes in the Olympic Games. The correspondence, documents, publications, and public relations campaigns of the Women's Division of the National Amateur Athletic Federation (NAAF); the Women's Committee of the American Physical Education Association (later becoming NSWA/DGWS of the American Association for Health, Physical Education and Recreation (AAHPER); and the National Association of Physical Education for College Women (NAPECW) were utilized. The materials were examined to determine the relative influence of these organizations in the promotion and/or opposition to the participation of women in the Olympics. Historical studies have well documented the general women's concept of "a game for every girl and a girl in every game"; yet little is known of the actual success of influence of their efforts, or the effect of changes in attitudes toward competitive athletics throughout the period of 1922-68. The results indicate: (1) The women's organizations did, in fact, protest and actively campaign against women participating in the early Olympic games, particularly in track and field and swimming. They were able to curtail highly competitive athletics in the educational setting, but were not as successful in the public sector. (2) After the merger of the NAAF and the NSWA, the two remaining organizations were more ambivalent toward the Olympics of 1948-56, assuming a "hands-off" policy. (3) By the Olympics of the 60's the NAPECW had withdrawn from policy making in athletics. The DGWS's changing attitudes and policies toward competitive athletics aided in the support of individual achievements for female athletes. A cooperative program between the United States Olympic Committee and the DGWS was an important step in visible evidence of a new support by women physical educators of the Olympic movement. It can be concluded that women physical educators through their organizations were only partially successful in their efforts to curtail women's participation in the Olympics of the 20's and 30's; became ambivalent toward the post-war Olympics; and finally supportive, thereby enhancing the opportunities for the elite female athlete as she struggled for the Olympic Gold.

Joan S. Hult
Department of Physical Education
University of Maryland
College Park, Maryland 20742

April 23, 1982
2:15 p.m.

A HISTORICAL STUDY OF PROFESSIONAL RUGBY LEAGUE IN ENGLAND DURING WORLD WAR II. John R. Schleppi, University of Dayton

The study examined the role of a sport in a country under the stress of modern warfare, particularly Rugby League in England during World War II. English newspapers, general war histories, Rugby League histories, records of the Rugby League administration and League clubs, and public records were examined. Twenty-one of the twenty-seven clubs then playing responded with information. Players, club officials, referees, newsmen, and others who were part of the war period were interviewed. The usual historical research procedures were employed in the study. The research was done in England in the autumn of 1979. Rugby League played a major part in the recreational life of northern England during the Second World War. During the period, between 70 to 90 percent of the clubs functioned each year. Even though there were restrictions due to the war, the game continued with governmental support (transportation easement, clothing coupons, and encouragement of charity matches), industrial and military cooperation (release of players on game days), along with the herculean efforts of the remaining administrators at the League and clubs. During the war, the Rugby League began a coaching scheme to develop youth players, streamlined its administration, and developed further plans for international competition. These augured well and aided postwar transition to the Rugby League successes in the late 1940s. Thus, although warfare involves nearly a whole society in its complex machinery, sport develops its organization to a high point to: 1) maintain a feeling of normalcy (One could look forward to rugby from week to week and it gave a feeling of fighting or working for a normal culture.), 2) promote civilian morale by diversion during leisure time, and 3) help avoid cultural shock that might result from the loss of an implanted activity. In conclusion, sport contributed to the war effort in an intricate and positive way.

John R. Schleppi
Dept. of Physical Education
University of Dayton
Dayton, OH 45469

April 23, 1982
2:30 p.m.

WORK, LEISURE, AND SPORT IN AMERICA: THE BRITISH TRAVELERS' IMAGE, 1830-1860. David K. Wiggins, Kansas State University

The purpose of this study is to reveal what British travelers said about the role of work, leisure, and sport in America during the thirty years prior to the Civil War. Historians have spent a good deal of time examining the sporting activities of Americans during the ante-bellum years but no one has analyzed the viewpoints expressed by the British travelers on this subject. Despite their limitations, British travel accounts are extremely valuable because they are frequently a source for data not obtainable elsewhere. Often the things found too commonplace for a native to discuss were considered sufficiently unusual to the stranger to merit comment and inquiry. New insight may thus be cast upon a topic not frequently deliberated upon. British travel accounts not only furnish an additional appraisal of American sentiments and biases, but frequently disclose those held by the visitor as well. On a number of occasions, travelers provided information on the role of work, leisure, and sport in their own country and civilization. This seems particularly valuable because it allows for an opportunity to compare Britain, which devised various sport forms, and America, which adopted and later modified many of those same cultural patterns. What is immediately apparent from this study is that between 1830 and 1860 America was gradually shifting from a tenacious, traditional, society to a restless and speculative nation intent on finding ways to get rich quick. Visitors were almost in total agreement that work was the way in which American men judged their worth as human beings and that leisure, to the extent that it existed in the new country, was usually taken up by the majority of citizens in those practical pursuits that either contributed to individual self-improvement or to the future and progress of the nation. Englishmen felt the one sport that was enthusiastically engaged in by Americans was trotting and the one segment of society who showed a particular preference for British sporting patterns was the wealthy Southern oligarchy. But generally British travelers said that sport per se was simply not what the Americans were most interested in during this period. Sport was essentially a sporadic phenomenon that was capable of soliciting a great deal of enthusiasm on particular occasions, yet in the grand scheme of things was generally not yet part of the mind set of most citizens. Sport certainly did not have the organizational structure or even come close to resembling the institution which it was eventually to become by the latter part of the nineteenth century.

David K. Wiggins
Dept. of H.P.E.R.
Kansas State University
Manhattan, Kansas 66506

April 23, 1982
2:45 p.m.

ROBERT ALLISON FETZER - ATHLETIC DIRECTOR AND TRACK COACH.

Angela Lumpkin, University of North Carolina at Chapel Hill

The purpose of this study was to describe the contribution of Robert Allison Fetzer to the University of North Carolina at Chapel Hill while he coached track (1924-1952) and directed the athletic program (1923-1952). Primary sources, such as Chancellor's Papers, newspapers, and physical education files, and secondary sources, such as books, yearbooks, reviews, and athletic press releases, were used to obtain information. Recognized as the "Dean" of Southern track and field athletics, Fetzer was acclaimed for his initiation of the Southern Conference Indoor Games (1930), the Carolina Relays (1942), and the Southern Invitational Indoor Games (1943). His teams at North Carolina won fourteen of twenty-eight outdoor and twelve of seventeen indoor Southern Conference Championships. As Athletic Director, Fetzer helped the University obtain six new sports facilities and add five varsity sports. He promoted his philosophy of "athletics for all" by providing intramural activities for all students and encouraging them to be active. He also administered the physical education requirement and majors' program. For his valuable service to the University he received numerous awards. One significant recognition was the naming of the University's new (1981) physical education - intramural - athletics building in his honor. Robert Fetzer became one of the best known, best liked, and most highly respected athletic directors in the country. He was soft-spoken, kind, gentle, gracious, and of sterling character. It was repeatedly stated that rival athletic directors liked to do business with him. He was a living example of the values that he felt to be vital to any athletic program. Because of his personality, his high moral values, and his leadership in providing numerous and varied athletic opportunities, Fetzer had a tremendous influence on both high school and college track in North Carolina and throughout the South as well as on athletics in general.

Angela Lumpkin
Department of Physical Education
University of N.C. at Chapel Hill
Chapel Hill, NC 27514

April 23, 1982
3:00 p.m.

RELATIONSHIP BETWEEN GRADE LEVEL, AGE, MARIJUANA, TOBACCO, AND BEER/WINE USE OF STUDENTS IN GRADES SIX THROUGH TWELVE.

Thomas J. Gleaton, Georgia State University; Sidney P. Smith, Georgia State University

The specific objective of this study was to identify and compare the age and grade variables as related to beginning marijuana, tobacco, and beer/wine use of students located in a metropolitan area. This was a cooperative research project between PRIDE (Parent Resources and Information for Drug Education) and one metropolitan Atlanta area school system (Gwinnett County Schools). Data for this study were gathered through the use of a STUDENT SURVEY instrument which was developed by PRIDE and used in many similar studies prior to this one. Responses (38,986) from a sample size (N=12,962) representing grades six (6) through twelve (12) were catalogued as follows: Marijuana use (N=13,867); Tobacco use (N=14,677), and Beer/wine use (N=10,441). Based on the responses given by this sample the following results were found: YES responses to marijuana use: 53% for 12th grade; 51% for 11th grade; 41% for 9th grade & 10 grade; 21% for 7th & 8th grade; and 13% for 6th grade. YES responses to tobacco use: 61% for 12 grade; 60% for 11% grade; 67% for 9th & 10th grade; 48% for 7th and 8th grade; and 34% for 6th grade. YES responses for beer/wine use: 78% for 12th grade; 71% for 11th grade; 61% for 9th & 10th grade; 34% for 7th and 8th grade; and 23% for 6th grade. It can be concluded from the results of this study that the use of all these substances increased with age and the rate of use increases over grades six through twelve as follows: Tobacco (twice the percentage); Beer/wine (three times (+) the percentage); and marijuana (four times the percentage). Students begin using tobacco and alcohol at a younger age than marijuana but the percentage of increase is much greater.

Thomas J. Gleaton, Jr., Ed.D.
Georgia State University
Atlanta, Georgia 30303

April 23, 1982

3:30 p.m.

THE TEXAS YOUTH HEALTH AWARENESS SURVEY. James Burdine, Meei-Shia Chen, Nell Gottlieb, Fred Peterson and Demetri Vacalis, The University of Texas at Austin

The purpose of this study was to determine the cardiovascular health related practices and knowledge of 7th and 8th grade students in Texas. The objectives included the identification of physical exercise activities, nutritional habits, leisure time activities and interests, awareness and knowledge of heart disease, and selected media information and personalities of interest. Demographic data were also collected. The methodological procedures consisted of a self-administered questionnaire completed by students in the classroom. A total of 52 schools in 22 cities were selected to provide a representative sample of rural and urban areas. Analysis of the demographic data indicated that the sample was also representative on the basis of public/private school and ethnic group ratios as well. The total number of respondents was 2,695. Demographic variables were crosstabulated with the knowledge-behavior variables of (1) physical exercise - which include both frequency and types of activities,(2)nutrition-these data include number of meals and snacks, types of food eaten for snacks and composition of typical breakfast,(3) activities and interest - which include after-school activities, extent of friendship networks and parent/friends/self tobacco habits,(4) knowledge of heart disease - this includes medical care habits, and cognitive information about heart disease,(5) media and personalities - such as how often listen to radio or tv and to what kind of programming. General results indicated trends on the basis of ethnicity in terms of physical activity, nutritional patterns and heart disease knowledge. Differences on the basis of sex were identified in all five categories of knowledge-behavior variables. Implications for health education and prevention strategies for adolescent populations related to heart disease were drawn from the findings.

James Burdine
Dept. of Health Education
The University of Texas at Austin
Austin, Texas 78712

April 23, 1982
3:45 p.m.

IS THERE A NEED FOR SCHOOL HEALTH EDUCATORS TO ADDRESS TEACHER BURNOUT? Philip A. Belcastro and Robert S. Gold, Southern Illinois University at Carbondale

The purpose of this study was to explore the relationship between descriptive data and patterns of somatic complaints and illnesses among teachers under considerable amounts of occupational stress. A standardized measure of burnout (Maslach Burnout Inventory) was used as a measure of occupational stress, and the Teacher Somatic Complaints and Illness Inventory was used to collect data on the somatic complaints and illnesses of teachers. The final study sample consisted of 359 respondents who spent at least 65% of their time in classroom instruction. More than 11% of the teachers in this study were burned out when conservative guidelines were used. An examination of 23 descriptive variables indicate that there were few differences between the teachers who were not burned out and those who were. There were significant differences in the frequency and/or intensity of 23 somatic complaints experienced between the two groups of teachers. A discriminant analysis stepwise variable selection revealed that 32 somatic complaints could be utilized to discriminate between the two groups of teachers with 91% accuracy. The discriminant analysis had a canonical correlation of .65 and a level of significance beyond .001. From these data, it can be concluded that teacher burnout represents a condition associated with some health risks to the teachers studied. These data coupled with data from previous studies can assist health educators and related professions in developing early detection and prevention programs for teacher burnout victims.

Philip A. Belcastro
Department of Health Education
Southern Illinois University
Carbondale, Illinois 62901

April 23, 1982
4:00 p.m.

AN ANALYSIS OF RESEARCH PUBLISHED IN HEALTH EDUCATION JOURNALS: MAY 1980 - MAY 1981.

Gregory H. Frazer, Robert S. Gold, Southern Illinois University

The purpose of the current study was to provide a descriptive assessment of research published in health education related journals. This assessment provides an indication of the "state-of-the-art" with regard to methodologies utilized in health education research and the completeness of journal reporting practices. The sample consisted of 448 articles which were divided into four categories of research: experimental, quasi-experimental, non-experimental, and philosophical/theoretical. The articles placed in the three former categories (N=240) were examined in the current study. The articles were all published in one of eight health education related journals, including: American College Health Association Journal; American Journal of Public Health; Health Education; Health Education Quarterly (Monographs); Health Values; Achieving High Level Wellness; International Journal of Health Education; and Journal of School Health. The assessment instrument was a modification of an instrument designed by Kohr and Snydam. Inter-rater reliability was assessed by analysis of variance procedures adjusted for differences in frames of reference as defined by Winer. In all, 448 articles were reviewed over the 12-month period covered by the current study. Theoretical articles accounted for 46% of those reviewed, with the remainder divided between non-experimental research (31%), quasi-experimental research (22%) and experimental studies (1%). The review of the 240 research studies indicated a broad range of sophistication and methodologies applied to health education questions. The current study provides insight into research published in health education. In that this type of assessment has been absent from the existing literature, the current study provides pilot data which can be utilized in future qualitative research on the health education literature. Without the evaluation of health education literature, it is impossible to accurately judge the impact of research upon health professionals. In light of the persistent push for continuing professional education via the literature as well as other means, it becomes imperative that monitoring of research quality be initiated and maintained.

Gregory H. Frazer
Dept. of Health Education
Southern Illinois University
Carbondale, IL 62901

April 23, 1982
4:15 p.m.

APPLICATION OF INOCULATION THEORY TO ALCOHOL EDUCATION EFFORTS.

Elias J. Duryea, University of Nebraska, Lincoln

The purpose of this study was to develop and evaluate an educational unit to teach students skills that would enable them to extricate themselves from risky alcohol-related situations. Additionally, the study assessed the utility of McGuire's Theory of Inoculation within the context of alcohol education. Inoculation Theory contends that exposure to the content of persuasive arguments (attacks) before contact with them generates greater resistance to such arguments. This concept was applied toward two potent concerns in Health Education: (a) drinking and driving and (b) accompanying those who drink and drive. The Solomon Four-Group Design was utilized in the study. One-hundred and eighty ninth grade subjects were randomly assigned to two experimental groups and two control groups. Study instruments were shown to have high degrees of validity and reliability. Independent variables consisted of a film, a structured discussion session, various role play scenarios and a slide shown component. Using a variety of techniques, subjects were exposed to the persuasive arguments used by drinking drivers in alcohol-related situations. They were then given practice in refuting these arguments and received feedback on their responses. Results indicate that students at the ninth grade level can be "inoculated" against persuasive arguments involved in youthful drinking and driving situations. Students in the experimental groups demonstrated significantly higher skill at refuting persuasive arguments in risky situations than students in the control groups. The applicability of Inoculation Theory to Alcohol Education efforts is deemed to be very strong.

Elias J. Duryea
School of H.P.E.R.
Univeristy of Nebraska
Lincoln, Nebraska 68588

April 23, 1982
4:30 p.m.

AN EFFICIENT AND COST-EFFECTIVE METHODOLOGY FOR COLLECTING HEALTH PROMOTION/DISEASE PREVENTION SURVEY DATA. Gregory M. Christenson and Margie S. Freston, University of Utah

It has long been a goal of health services researchers to improve the delivery of medical services. One method used by such researchers to gain needed knowledge in programing is the social survey. Such surveys are quite helpful in identifying potential target groups for specific health care programs. While much data related to traditional health problems have been collected in communities, very few systematic attempts have been made to collect behavioral risk factor data for use in health promotion programing. The purpose in conducting this pilot study was to develop an efficient and cost-effective method for collecting behavioral risk factor data for use in health promotion/disease prevention programing. The procedure combined the random digit dialing and mailout questionnaire survey techniques. Subjects for the project were identified to be recipients of a mailout questionnaire by use of a random digit dialing technique. The procedure resulted in a 92% rate of return from a 15-page, 96-item mailout questionniare. The methodology was replicated on two other health studies resulting in a response rate of 87% in a diabetes survey, and an 89% response rate for a second health promotion risk factor questionnaire. Costs for the various questionnaires, including data reduction and analysis, ranged from $5.40 to $6.30 per respondent.

Gregory M. Christenson
College of Health HPER N-212
University of Utah
Salt Lake City, Utah 84112

April 24, 1982
9:00 a.m.

THE EFFECTS OF MODELING AND GUIDED PRACTICE IN PROMOTING BREAST SELF-EXAMINATION.

Robert J. McDermott, Southern Illinois University; Phillip J. Marty, University of Minnesota, Duluth

The purpose of this study was to assess the effectiveness of modeling and guided practice on participant knowledge, attitudes, and subsequent performance of breast self-examination. Three alternative educational programs were established which included the following treatments: 1) exposure to pamphlets containing information on breast cancer and breast self-examination; 2) exposure to modeling and pamphlets; and 3) exposure to modeling, guided practice, and pamphlets. The population for this study consisted of 219 college-aged female subjects. The subjects were randomly assigned to one of the three treatments. A post-test only control group design was used. After completion of each treatment, subjects responded to a knowledge and attitudes inventory. At six months a questionnaire was mailed to each subject requesting information on breast self-examination practice. ANOVA was used to assess differences on knowledge scores while χ^2 assessed differences among attitudes and on breast self-examination practice at six months. Results indicated no difference on knowledge scores; however, differences did occur among selected attitudes. Results on the six-month follow-up indicate significant differences on self-examination behavior among the group exposed to pamphlets and those exposed to both modeling and guided practice ($p > .05$). Furthermore, self-examination practice reported at the time of the study improved from an average of 30% for all groups to 68% among individuals who responded to the questionnaire.

Robert J. McDermott, Ph.D.
Department of Health Education
Southern Illinois University
Carbondale, IL 62901

April 24, 1982
9:15 a.m.

SOCIO-DEMOGRAPHIC ANALYSIS OF TOOTHBRUSHING, FLOSSING, AND DENTAL VISITS OF AMERICAN FAMILIES. Meei-Shia Chen, The University of Texas at Austin

The purpose of this study was to determine whether the patterns of dental activities, including toothbrushing, flossing, and dental visits, differed with respect to socio-demographic variables. Data for this national study were collected by a questionnaire mailed to a cross-sectional sample of 1,000 families selected by using a stratified quota sampling to conform to the latest (1970) available U.S. Census Data for nine geographical divisions of the country. Each division within the sample was representative in terms of population density, age of homemaker, annual family income, and family size. Seven hundred and eight families returned the questionnaire. A chi-square test was performed on each of the dental activities by each socio-demographic variable. The results of the tests were analyzed and compared. Family income and level of education were found to have significant influence ($\underline{P} < .001$) on the dental activities. More specifically, the American family members with lower income and/or educational level tended to follow less strict toothbrushing schedule, floss less frequently, and visit dentists less regularly. Region, population density, age (of parents), size of family, and presence of children did not produce consistent significant results. In addition, toothbrushing, flossing, and dental visits exhibited similar patterns of influence by socio-demographic variables, but the degree of the influence differed. Dental visit was the most strongly influenced while toothbrushing was the least. The applicabilities of these results in guiding dental health programs were discussed. Special efforts should be allocated to the underprivileged groups with lower income and education level in promoting dental education.

Meei-Shia Chen
Dept. of Physical and Health Educ.
University of Texas at Austin
Austin, Texas 78712

April 24, 1982
9:30 a.m.

PRIMARY CARE PHYSICIANS AS A SOURCE OF HEALTH EDUCATION NEEDS ASSESSMENT DATA. Kathleen D. Mullen, Lexington County Hospital, W. Columbia, SC; Gerald E. Costello, Univ. of South Carolina

This study was conducted as part of a total needs assessment effort designed to aid in the program planning functions of hospital based community health educators. Surveys were mailed to 72 hospital staff primary care physicians to assess 1)physician perceptions of current health status of county residents, and 2) physician attitudes regarding support of and referral to hospital sponsored community health education programs. Primary care physicians possess valuable insights into health status which can enhance standard epidemiological assessments. Physician attitudes regarding support and referral also have a direct impact on the success of most hospital-based health education programs. Of the 72 primary care physicians surveyed, 31 (43.5%) participated in the study. The following medical specialities were considered primary care and were utilized as subgroups for data analysis: 1) General/Family Practice, 2)Internal Medicine, 3)Emergency Room, 4)Ob/Gyn, and 5)Pediatrics. Demographic data also included 1) solo/group practice, 2)board certification, and 3)number of years in practice. Frequencies, percentages and means were calculated for all study groups. Health status results indicated that although physicians' perceptions of morbidity for their top health concern (heart disease) agreed with the county mortality statistics, their second major health concern (diabetes) did not. Diabetes ranked 7th for county mortality. Lifestyle intervention data demonstrated that the major health education program to which physicians would make referrals was smoking cessation (52% indicating potential referral). Over 25% would also refer to obesity, diet, and exercise programs (39%, 32%, and 29% respectively). A demographic profile indicated that 1)specialization in Family Practice or Internal Medicine, 2)board certification, 3)affiliation with a group practice, and/or 4)having practiced less than 5 years, may be characteristic of current positive referral attitudes. These referral rates represent baseline data, or data collected before implementation of an organized effort to recruit physician referrals. It appears that many physicians are receptive to community health education lifestyle intervention programs. Communication channels between primary care physicians and the health education staff may be the key to the development of a successful physician referral mechanism. Such a mechanism would be a valuable asset in terms of program enrollment and program validity as perceived by the consumer. Physician involvement may help facilitate this process.

Kathleen D. Mullen
Health Education Department
Lexington County Hospital
W. Columbia, SC 29169

April 24, 1982
9:45 a.m.

RESULTANT BALL VELOCITY AS A FUNCTION OF OFF-CENTER IMPACT AND GRIP FIRMNESS. Mark D. Grabiner, Jack L. Groppel, Kevin R. Campbell, University of Illinois, Champaign-Urbana

The effects of resistance to rotation about the longitudinal axis of a tennis racquet on postimpact ball velocity following off-center hits were investigated. Two conditions simulating the extremes of grip firmness (zero versus maximal) were compared. Tennis balls were dropped vertically onto the racquet face from a height of 5.75 meters and impacted at 10.62 meters per second. Forty-one trials were filmed at 175 frames per second and electronically digitized. Results were subjected to a multivariate analysis of covariance (ANCOVA) using transverse and longitudinal distance of impact from the geometric center of the racquet as covariates. ANCOVA results indicated no significant differences between postimpact ball velocity for the two conditions. It was concluded that previously reported concepts regarding striking mass and grip rigidity are no longer tenable and that the influence of grip firmness in activities in which hand-held implements are used is important only in terms of postimpact implement control.

Mark D. Grabiner
Biomechanics Research Laboratory
212 Freer/906 S. Goodwin Avenue
Urbana, Illinois 61801

April 24, 1982
10:15 a.m.

EFFECTS OF NEUROMUSCULAR ELECTRICAL STIMULATION ON THE FRACTIONATED COMPONENTS OF RESPONSE TIME. Terry Ward and Mark D. Grabiner, University of Illinois, Urbana-Champaign

Two investigations were conducted to quantify the chronic effects of electrical stimulation (ES) on the components of response time (RSP) for a maximal dynamic elbow extension task. During the initial phase of the study, subjects (n=12) made up three experimental groups which participated in a pretest, one, two or three weeks of ES of the triceps brachii m., and a posttest. RSP was electronically fractionated into premotor reaction time (PMT) and motor duration (MD) which combined motor reaction time (MT) and movement time (MVT). Statistical analysis indicated significant reciprocal changes in both components. The greatest decreases for MD and PMT occurred after one and three weeks, respectively, and the largest increases indicated after three weeks and one week for MD and PMT, respectively. No significant changes in the RSP components were observed in the control group. The second phase of the investigation utilized new subjects (n=6) who all participated in a pretest, five weeks of ES, and five weekly performance tests. In this investigative phase, MD was fractionated into its components and acceleration data was collected. Results of this study indicated the decreases originally observed in MD were manifested by a significant linearly decreasing trend for MT. MVT was not found to be affected by the treatment nor were the associated acceleration data. The changes in RSP and its components were found to be consistent with the changes observed in the first half of the study. Two additional weeks of treatment did not result in greater changes than three weeks of ES. Results indicated that ES can affect components of the RSP paradigm but the particular regime investigated was not as effective as those reported by other investigators.

Mark D. Grabiner
Biomechanics Research Laboratory
212 Freer/906 S. Goodwin
Urbana, Illinois 61801

April 24, 1982
10:30 a.m.

RELATIONSHIPS OF IEMG TO FREQUENCY DISCHARGE AND TENSION LEVELS.

Rick N. Robertson, University of Illinois; Mark D. Grabiner, University of Illinois; Terry Ward, University of Illinois

The purpose of this study was to examine the relationships between the integrated electromyogram (IEMG) and two methods of determining motor unit discharge frequency during different levels of isometric tension. Five male and three female subjects performed four, two trial bouts of isometric elbow flexion at 25, 50, 75, and 100 per cent maximum voluntary isometric contraction (MVIC). Frequency discharge was determined by digital and manual spike counting techniques. Discriminator levels of 0 (zero crossings), 25, 50, and 75 per cent of peak emg amplitude at MVIC were used for digital counting at each tension level. Manual spikes were determined from an oscillograph tracing taken during the same sampling period and IEMG data were concurrently summed digitally each millivolt second. Statistical analysis indicated a significant correlation between IEMG and manual spike counts. A significant quadratic relationship was found between IEMG and tension, and a repeated measures analysis of variance indicated significant main effects for tension on IEMG. Subsequent post hoc analyses revealed significant differences between all levels of tension excluding 75 and 100 per cent MVIC. The results of this study indicate that choosing an inappropriate discriminator may lead to a spike count-IEMG relationship which is inconsistent with that which could be expected from differential motor unit recruitment. It was demonstrated that manual spike counting should not be used as a technique for assessing the relationships between IEMG and frequency discharge. Further, the relationships between IEMG and tension may reveal a changeover in the type of recruitment (phasic versus tonic motor units) at higher levels of tension.

Rick N. Robertson
Biomechanics Research Laboratory
University of Illinois
Urbana, Illinois 61801

April 24, 1982
10:45 a.m.

BIOMECHANICAL IMPLICATIONS FOR THE INSTRUCTION OF SELECTED RACQUETBALL SKILLS.

James W. Kent, University of Delaware; David A. Barlow, University of Delaware

The purpose of this project was to identify selected mechanical aspects of performance and determine appropriate teaching cues for the development of skill by racquetball players. High speed cinematographic and precision motion analysis techniques were used to investigate the performance of forty (40) racquetball players from the "open", B and "novice" categories of ability. The data were reduced to identify ball velocity, height of ball when contacted by the racquet, horizontal distance between location of ball at contact and the leading foot, and stride length for both the forehand and the backhand kill shots. Both male and female subjects were included in the project. The results indicated that male open level players generate 21% greater ball velocity ($\bar{X}$=108.3 vs 89.2 mph) than do female players for the backhand kill shot. The male open level player also consistently generated greater ball velocity than does the "B" level player who in turn has greater velocity than the novice player (forehand $\bar{X}$s=126.7, 114.3, 77.8 mph; backhand $\bar{X}$s=113.2, 101.3, 94.3 mph). In the forehand and backhand kill shot, the ball at racquet contact was closest to the floor for the open level players and highest from the floor for the novice level player (forehand $\bar{X}$s=7.95, 12.9, 18.7 in.; backhand $\bar{X}$s=16.3, 18.3 20.2 in). The forehand kill shot was struck by the open players closest to the vertical line of gravity than the B players who in turn were closer than the novice players ($\bar{X}$s=1.35, 3.43, 5.15 in). In the backhand kill shot, the better players were hitting the ball closer to the vertical line of the shoulder than were the less skilled players ($\bar{X}$s=.7, 2.9, 2.5 in). The stride length of the open players in the forehand stroke were 12.3% greater than for the B level and novice class, while the women demonstrated a 21.7% greater stride length than the men in the backhand kill stroke. The results of this project indicate that teaching strategies should be used that emphasize the importance of a low height of the ball at racquet contact while hitting both forehand and backhand kill shots and that the two skills are not mirror images of one another as is reflected by the position of the ball in relation to body segments during ball contact. The teaching cue of hitting the ball (both forehand and backhand kill shot) off the toe of the leading foot is inappropriate and better cues are: 1. hit the backhand shot on a vertical line from the shoulder, 2. hit the forehand shot at mid-stride or on a vertical line from the center of gravity.

James W. Kent
Department of Physical Education
University of Delaware
Newark, Delaware 19711

April 24, 1982
11:00 a.m.

PERFORMANCE ABILITIES OF PRESCHOOL AGE CHILDREN ON SELECTED MOTOR PERFORMANCE TASKS. David L. Gallahue, Indiana University; Stephen D. Frederick, Wright State University; Harold H. Morris, Indiana University

The purpose of the study was to investigate the performance abilities of three, four, and five year old children on a variety of motor performance tests. The three experimental variables were: (1) age (3.5, 4.0, 4.5, 5.0, 5.5 year old children); (2) sex (male and female); and (3) race (black and white). Subjects for the study were 200 children selected in a stratified random manner. Subjects were evaluated on each of the following eight motor performance tasks: throw for distance, throw for accuracy, kick for accuracy, vertical jump for distance, standing long jump for distance, right foot balance for time, left foot balance for time, and 20-yard run for time. Reliability of the measurement procedures was determined from data collected in a pilot study. A three-factor fixed effects model was the basic design used to contrast the independent variables. A multivariate analysis of variance and various follow-up procedures were used to analyze the results. An analysis of the results led to the conclusions that: (1) a near linear relationship existed between age and improved performance scores for all eight motor performance tasks; (2) differences between age groups were greatest between the oldest two groups; (3) boys outperformed girls in the throw for distance, throw for accuracy, and vertical jump; (4) girls outperformed boys in the right foot balance, and left foot balance; (5) black children significantly outperformed white children in the vertical jump; (6) there was no interrelationship between the eight motor performance tasks.

David L. Gallahue
School of HPER
Indiana University
Bloomington, Indiana 47405

April 24, 1982
11:30 a.m.

AGE DIFFERENCES IN THE RETENTION OF LOCATION AND DISTANCE INFORMATION FOR A SIMPLE ARM MOVEMENT.

Kathleen Williams and Betty Ann M. Turpin, University of Wisconsin

The ability of 6, 8, and 10 year old children and adults to retain and to reproduce accurately a horizontal arm movement using either location or distance characteristics was tested. Previous research has demonstrated that adults are able to use location cues with more accuracy than distance information when performing these simple movement tasks (Keele & Ells, 1972: Laabs 1973). Research with children in this area has examined almost exclusively the use of location information. Additionally, most of these studies have used "atypical" (e.g., MR, blind) subjects (Kelso, Goodman, Stamm & Hayes, 1979; Reid, 1980). In the present study, normal subjects attempted to reproduce short and long movements immediately or after 15 seconds, using either distance or location information. Each subject was tested under both conditions. Trials were administered randomly using four reproduction start positions that were unconfounded with the criterion movement. Following data collection, separate analyses were performed on AE and CE. As expected, the Age X Mode (distance/location) interaction was significant for both AE and CE. Post-hoc comparisons showed that adults performed similarly under distance and location conditions and were more accurate than any of the children. In addition, the children performed more poorly when they were instructed to use distance cues than when they used location. Prior to testing, all subjects had been questioned for their understanding of distance and location concepts. Despite their apparent comprehension, many children apparently were unable to use distance information consistently. Other results included the occurrence of "typical" range effects for adults: They overshot short movements and undershot long movements. In contrast, children overshot both movement lengths, but to a lesser extent for the long movement. Finally, there was a main effect for retention interval (RI), with larger errors after 15 seconds. There were no significant mode or age-related interactions with RI, however. Mean values suggested that children's performances deteriorated over the long retention interval, but they were statistically insignificant. Insufficient power, due to small sample size, may be a reason for the failure to reach significance.

Kathleen Williams
Department of P.E. and Dance
University of Wisconsin-Madison, WI

April 24, 1982
11:45 a.m.

UNDERHAND THROWING PATTERNS OF KINDERGARTEN AND FIRST GRADE CHILDREN. Ralph Wickstrom, Ripon College

The underhand throwing performances of 39 kindergarten and 37 first grade children were filmed and analyzed to determine developmental components. The 76 children were filmed individually while throwing a tennis ball and while throwing an 8 inch rubber playground ball at a wall target 15 ft. away. Each child was asked to throw "hard" at the target using an underhand motion. Practice was provided on the day prior to filming but no instruction was given. The throwing patterns were examined with respect to changes in foot and leg action, hip and trunk movement, arm action, and pattern coordination. Foot positions and movement closely resembled those which have been found in the developmental progression of overhand throwing patterns; i.e., feet were together and stationary, or same side foot was forward and stationary, or same side foot stepped forward, or opposite foot was forward and stationary, or opposite foot stepped forward. Leg action improved by progressing from essentially no movement to a lifting motion produced by vigorous knee extension and finally to an effective forward driving-blocking sequence. Hip/trunk rotation showed a diverse range from minimal block rotation to various segmental sequences. Arm action in the underhand small ball throw was the most consistent aspect of the pattern. The throwing arm invariably was straight at the elbow from the beginning of the forward movement until after release. Other aspects of arm action such as range of motion, point of release, and follow through varied considerably. Movement patterns used in throwing the larger, heavier playground ball were notably different especially in foot action and in arm movement. A forward stride with the opposite foot was more commonly used and a two-handed, bent-elbow arm action was overwhelmingly preferred. Some changes in the components of the underhand throwing patterns were interrelated; however, discrete developmental patterns did not emerge in the performances of the children in this study.

Ralph Wickstrom
Ripon College
Ripon, Wisconsin 54971

April 24, 1982
12:00 a.m.

PREPERFORMANCE CONFIDENCE AND PERFORMANCE FEEDBACK AS FACTORS AFFECTING THE MOTOR PERFORMANCE OF PREADOLESCENT CHILDREN.

Michael J. Stewart, University of Nebraska-Omaha; Charles B. Corbin, Kansas State University

The purpose of this study was to determine if postperformance differences in self-confidence, as measured by predictions of success in the performance of a motor task, existed between groups of boys and girls who received differing feedback conditions and who possessed different preperformance confidence levels. Previous research suggests that young females may be more dependent on performance feedback than young males. This is particularly true when the motor task to be performed is perceived to be sex role inappropriate or competitive in nature. This study was designed to determine if the greater need for performance feedback among females was truly a result of differences between sexes or merely a result of differences in preperformance self-confidence levels. From a larger pool of 4th, 5th, and 6th grade subjects, 14 boys and 14 girls measured to be high in confidence and 14 boys and 14 girls measured to be low in confidence were selected as subjects. Seven subjects within each sex-age group were assigned to a feedback condition and seven to a no feedback condition. Feedback subjects received verbal information concerning the quality of their performance on the motor task. Balance, using the stability platform, was the task performed. Preperformance assessment indicated it was perceived as sex role appropriate for boys or girls and the task was performed individually so that it was not competitive. As expected, there were preperformance differences in self-confidence as subjects were leveled to assure confidence differences. A 2 X 2 X 2 (sex X feedback X confidence) ANOVA yielded no main effect for sex or feedback (postperformance). However, both the sex X feedback and the confidence X feedback interactions were significant at the .055 level. This result suggests the need for follow-up research. Though other variables related to the sex of the subject may explain sex differences in feedback dependence, it may be that low confidence, regardless of sex of subject, may be a major factor explaining performance feedback dependency.

Michael J. Stewart
School of HPER
University of Nebraska-Omaha
Omaha, Nebraska 68182

April 24, 1982
12:15 a.m.

LEARNING AND SENSORY MODALITY EFFECTS ON REACTION LATENCY.

Harold H. Morris, Indiana University; R. Scott Billings and Victor H. Mancini, Ithaca College

This investigation considered the effects of learning to respond under conditions that provided stimulation to a single stimulus modality upon the reaction time to a combined visual-proprioceptive stimulus. Thirty college students were randomly assigned to one of three practice conditions; subjects in one group reacted to a visual stimulus while subjects in a second group reacted to a proprioceptive stimulus. In the third condition, a control, subjects responded to a combined visual-proprioceptive stimulus. Under the visual conditions, subjects watched for the initial movement of a joy stick and responded by releasing a depressed response key. In the proprioceptive condition, subjects were blindfolded and their left hand grasped the joy stick. They were instructed to respond to the initial feeling of movement of the joy stick by releasing the response key. Subjects in the visual-proprioceptive condition grasped the joy stick and were instructed to release the response key when they initially felt or saw the movement of the joy stick. Following five (5) days of practice under the specific stimulus condition, all subjects completed five additional test days under the visual-proprioceptive condition. A 3 x 2 x 5 factorial arrangement with repeated measures on two factors was the design used to contrast the independent variables. Intraclass correlation procedures were used to estimate the reliability of the data. The following table presents the mean reaction time in milliseconds for the three groups across the practice and testing conditions.

GROUP	PRACTICE	TEST
VISUAL	221.3	171.2
VISUAL-PROPRIOCEPTIVE	173.6	163.7
PROPRIOCEPTIVE	168.0	155.7

The visual condition produced significantly slower times during the first week of practice than the proprioceptive and visual-proprioceptive groups. The three groups did not differ significantly under the test condition. Thus, transfer between practice and testing conditions was different for the various practice groups. It was concluded that reaction time is mediated by the properties of the immediate stimulus conditions to a greater extent than by the nature of the prior practice conditions.

Harold H. Morris
Department of Physical Education
Indiana University
Bloomington, Indiana 47405

April 24, 1982
1:15 p.m.

UTILIZATION OF AUGMENTED - CONCURRENT FEEDBACK IN THE POSITIONING OF NATURAL AND PROSTHETIC LIMBS. Patrick Patterson and Charles Shea, Texas A&M University

The human learner is thought to utilize information from various sources to modify ongoing movements and/or evaluate the success of previous movements in an attempt to maximize response accuracy and minimize response variability. The present investigation examined the effects of augmented auditory information on the linear positioning performance of subjects utilizing natural or prosthetic limbs. It was hypothesized that "normal" subjects would perform better than subjects with prosthetic limbs unless augmented auditory information was provided. The subjects (N=10) were male volunteers. Five of the subjects had above elbow amputations and had utilized their prosthetic devices for a mean of 8.3 years. The other five subjects were randomly selected from a volunteer pool and had no diagnosed limitations. Movements were made and measured on a standard linear slide. A pulsing infra-red diode was attached to the movement cursor opposite the subject. An infra-camera and microprocessor (Selspot #413) translated the movement of the diode into a corresponding change in voltage. The voltage was simultaneously applied to an audio device that provided the augmented feedback. Thus, the movement of the cursor by the subject was paralleled with a linearly-related change in audible frequency (HZ). Subjects performed fifteen (15) trials at each three retentions (immediate, 15-sec. unfilled, and 15-sec. filled) both with and without augmented auditory information for a total of ninety (90) trials. The results of Group x Feedback x Retention Interval analysis of variance on absolute and variable error indicated both a Group x Retention and a Group x Feedback interaction. Subjects utilizing a prosthetic limb to produce the movement were less accurate and more variable than "normal" subjects when augmented auditory feedback was not present but more accurate and less variable when the augmented feedback was provided concurrent with responding. The "normal" subjects apparently were unable to or chose not to utilize the augmented feedback, while this information may have been the only reliable information available to amputee subjects.

Patrick Patterson, Dept. Hlth.& PE
Texas A&M University
College Station, Texas 77843

April 24, 1982
1:30 p.m.

EFFECTS OF AGE, SEX, AND TEMPORAL SPACING OF A MODEL ON CHILDREN'S PERFORMANCE OF A BALL STRIKING TASK.

Dean F. Anderson, James A. Gebhart, Dale G. Pease and Allan A. Rupnow, Iowa State University

The present investigation examined the effect of subject's age, sex, and temporal spacing of a skill model upon performance of a ball striking task. Ninety male and 90 female children from four second-grade and four fourth-grade classes were randomly assigned to one of three treatment groups. Subjects assigned to the beginning model treatment (BM) watched a video-taped demonstration by the regular male physical education teacher modeling the ball striking task and then performed 16 trials. Middle model (MM) subjects performed eight trials and then viewed the video-taped model and performed another eight trials. Subjects in the no model (NM) treatment performed the 16 trials without any demonstration. Each subject performed 16 trials of 20 sec. of the ball striking task with a 20 sec. rest between each trial. A one-minute rest was given between trials eight and nine. A 2 X 2 X 3 X 16 (age by sex by treatment by trials) repeated measure ANOVA was performed on the dependent measure, number of hits. Data showed significant effects for age (F(1,168)=137.98, P=.0001), sex (F(1,168)=16.81, P=.001), model condition (F(2,168)=5.31, P=.006), and trials (F(15,2520)=46.29, P=.0001). Examination of the interactions for the main components of age, sex and model condition showed significance for only the age by sex interaction (F(1,168)=7.72, P=.006). Results indicate that sex differences are greater for the older subjects. Significant trial effects were found for both age (F(15,2520)=4.70, P=.0001) and model condition (F(15,2520)=6.68, P=.0001). Nine-year-old subjects not only perform better than seven-year-old subjects, but they also display greater improvement across trials than seven-year-olds. Performance curves for all treatments are similar across the first eight trials. However, beginning with trial nine, the trial immediately after the model is given to the MM subjects, the MM subjects display greater improvement. Support was found for previous modeling investigations which indicated that age, sex and task are important variables relating to the performance effects of models and temporal placement of the model.

Dean F. Anderson
Dept. of Physical Education
Iowa State University
Ames, Iowa 50011

April 24, 1982
1:45 p.m.

CONSOLIDATION OF PURSUIT ROTOR LEARNING UNDER CONDITIONS OF INDUCED AROUSAL. Richard H. Cox, Kansas State University

Consolidation theory as explained by Walker (1958) and Walker and Tarte (1963) posits that high arousal during the acquisition phase of learning a psychological task will result in a more intense activity trace process. The purpose of this investigation was to test the basic tenants of consolidation theory by studying the relationship between induced arousal and the performance and learning of a pursuit rotor task. Ninety-six subjects (48 men and 48 women) were randomly assigned to one of three induced arousal conditions (control, failure feedback, and electrical shock). Subjects were given 21 20-second acquisition trials under induced arousal conditions followed 24 or 48 hours later by nine trials in the absence of induced arousal (trials 22-30). The Spielberger A-trait test was administered before the 21 acquisition trials and the A-state test was given afterward. The results of the A-trait test revealed that arousal conditions were equal in terms of normal anxiety levels, while results of the A-state test demonstrated that subjects under induced arousal conditions were indeed stressed (higher levels of state anxiety). The 21 acquisition trials (seven three-trial blocks) were analyzed using time on target (TOT) scores to determine the effects of induced arousal on performance. The results of this analysis revealed reliable differences for sex and trial blocks, but not for induced arousal. TOT difference scores were analyzed to determine the effect of induced arousal on learning. The results of this analysis revealed a reliable blocks main effect, but unreliable differences for sex, arousal, and delay intervals. In summary, the results of the investigation failed to support the action decrement notion of consolidation theory. Subjects training under conditions of induced arousal did not exhibit inferior performance scores during acquisition trials or superior learning scores after a 24 or 48 hour interpolated rest period.

Richard H. Cox
Dept. of H.P.E.R.
Kansas State University
Manhattan, Kansas 66506

April 24, 1982
2:00 p.m.

RELATIONSHIP BETWEEN FORCE AND FORCE VARIABILITY OVER EXTENDED PRACTICE.

Cheryl C. Northam and Charles H. Shea, Texas A&M University

The critical assumption of linearity between force and force variability upon which the motor-output variability theory (Schmidt, Zelaznik, Hawkings, Frank, & Quinn, 1979) is based was examined over extended practice. It was hypothesized that practice would act to reduce the proportion (slope) between force and force variability while maintaining a near zero intercept. Subjects (N=14) exerted isometric force against a fixed attachment to a load cell in an attempt to "shoot" an oscilloscope dot to a target line displayed on the osilloscope. Seven target lines represented 12.5 to 87.5 percent of the subject's maximal contraction. Subjects performed three blocks of 70 trials (10 trials at 800 msec intervals for each target line) in each of 10 testing sessions. Force and force variability as well as absolute and variable force production errors increased as target lines (i.e., force requirements) increased, with these variables decreasing over practice. Contrary to the findings of Schmidt and his colleagues (e.g., Schmidt & Sherwood, 1980; Sherwood & Schmidt, 1981), there was no indication of reduced force variability for target lines above 65% of the subjects' maximal contraction. Indeed, a quadratic solution with a positively increasing slope best accounted for the relationship between force and force variability. Over practice the linear component increased and the quadratic component decreased. That is, greater improvement in response accuracy and stability was associated with higher force requirements.

Charles H. Shea, Dept. of Hlth. & PE
Texas A&M University
College Station, Texas 77843

April 24, 1982
2:15 p.m.

ACHIEVEMENT MOTIVATION AND SEX ROLE ORIENTATION OF HIGH SCHOOL FEMALE TRACK AND FIELD ATHLETES VS. NONATHLETES.

Keith Henschen, University of Utah; Steven Edwards, University of Utah; Linda Mathinos, University of Utah

The purpose of this study was to investigate the differences between female high school track and field athletes and nonathletes in regards to level of achievement motivation and sex role orientation. One hundred and thirty-four randomly selected high school female athletes (N=67) and nonathletes (N=67) were measured for achievement motivation (Mehrabian Scale of Achieving Tendency) and sex role orientation (Bem Sex Role Inventory). Differences in achievement motivation between the athletes versus the nonathletes and among the four groups representing sex role orientations were revealed by a 2 X 4 analysis of variance ($p > .05$). Relationships among the dependent variables, namely, achievement motivation and the feminine, masculine, undifferentiated and androgynous scales of the BSRI, were calculated using the Pearson-Product Moment Correlation Coefficient for the athletes and nonathletes separately as well as the total group. A discriminant analysis was conducted in order to determine if achievement motivation and the feminine and masculine BSRI scores could significantly discriminate between athletes and nonathletes. From the data analyzation it was determined that female athletes exhibited significantly higher levels of achievement motivation than did their nonathletic counterparts. Also, results indicated that a significant relationship exists between sex role orientations and achievement motivation. High levels of achievement motivation are related to androgynous and masculine sex roles, while low levels of achievement motivation are associated with feminine and undifferentiated sex role orientations.

Keith P. Henschen, P.E.D.
College of Health
University of Utah
Salt Lake City, Utah 84112

April 24, 1982
2:45 p.m.

ANXIETY AND PERFORMANCE RELATIONSHIPS IN FIRST TIME PARACHUTISTS.

Frank M. Powell and James P. Verner, Furman University, Greenville, South Carolina

Stress-induced state anxiety and pre-jump heart rates (HRs) were measured in 20 volunteer first time parachute jumpers, 5 of whom received approximately twice as much practice time (45-60 min) in a simulation training harness. Resting HRs and trait anxiety were obtained prior to training. Quality of parachute jumping performance was objectively rated and included observations of plane exit, canopy control, and landing. Significant negative relationships occurred between parachute jumping skill and: a) state anxiety (*r* = -.49), b) percent change in HR (rest to pre-jump, 81%, *r* = -.38), c) an experimenter-observed fear rating obtained just prior to plane exit (*r* = -.70). A stepwise multiple regression, computed with the composite performance score used as the dependent variable, resulted in an R value of .78, with fear rating, HR change and trait and state anxiety scores used as the predictor variables. Thus, 61% of the variation in performance could be accounted for. The mean trait anxiety scores for these jumpers was almost 4 points below the mean (39th%ile) reported for a large sample of college aged individuals. Considering the difficulty of the task and the extraordinary stress it places upon an individual, even comparatively low trait anxious subjects likely exceed their optimal arousal level. The 5 subjects receiving more practice displayed markedly reduced state anxiety and HR responses in association with maximum performance ratings.

Frank M. Powell
Health and Physical Education
Furman University
Greenville, SC 29613

April 24, 1982
3:00 p.m.

VICARIOUS SUCCESS EXPERIENCE AS A FACTOR INFLUENCING THE PHYSICAL ACTIVITY BEHAVIORS OF ADULT WOMEN. Charles B. Corbin, David R. Laurie, Candice Gruger, and Betty Smiley, Kansas State University

A considerable body of research evidence has accumulated in recent years which indicates that females are underrepresented in achievement occupations. Further, there is evidence that sports are achievement situations in which females are also underrepresented. Harter (1978) notes that three socializing phenomena account for many of the examples of underachievement among females. Specifically she lists the following factors: lack of reinforcement and/or disapproval for individual mastery attempts, modeling of disapproval, and reinforcement dependency on adults. For these reasons women with little experience in physical activity seem to need more than mere exposure to organized physical activity if they are to become active for a lifetime. Bandura (1977) notes that vicarious experience or modeling can be a good method of helping change the behaviors of those who lack the conviction that they can successfully execute a given performance. Such vicarious experience can provide the positive reinforcement and approval modeling which Harter notes is critical for females in achievement situations. The purpose of this study was to determine if vicarious success experiences (audiovisual presentations of women performing physical activity successfully) effect changes in the physical activity patterns of adult women. Thirty-nine adult women were randomly assigned to two exercise groups. Both groups participated in the same exercise class for two days a week for four weeks. The treatment group (n=20) received three audiovidual programs which provided vicarious success experiences, while the controls (n=19) viewed three audiovisual presentations relating to the rules and strategies of sports which are popular among women. Questionnaire responses concerning confidence in physical abilities, enjoyment of physical activity, as well as self-reported physical activity patterns served as dependent variables for the study. MANOVA, ANOVA, and Chi Square statistics were used to treat the data. Results indicate that a greater number of subjects in the vicarious experience group reported being physically active following the treatment than did control subjects. Further, the subjects in the treatment condition reported enjoying physical activity more and showed a greater increase in confidence than did control subjects. Vicarious success experience, in combination with a regular exercise program, seems to produce attitude and behavior changes not present in women receiving regular exercise only.

Charles B. Corbin
Dept. of H.P.E.R.
Kansas State University
Manhattan, Kansas 66506

April 24, 1982
3:15 p.m.

EFFECTS OF ACHIEVEMENT TENDENCIES AND COMPETITIVE OUTCOMES ON PERFORMANCE.

J. Robert Grove and David Pargman, Florida State University

Achievement tendencies have been shown to be related to a variety of behaviors, including persistence and performance quality. In general, individuals with high achievement tendencies persist longer and perform better in the face of continual failure than do individuals with low achievement tendencies. There remains some controversy, however, about the relationship of achievement tendencies to behavior in competitive situations. In addition, there is a general paucity of research on the behavioral consequences of continual success. The present study used the Mehrabian Scale of Achieving Tendencies to classify undergraduate males ($N=40$) as relatively high or low in achievement tendencies. Pairs of subjects then competed against each other in a best-three-out-of-five dart tossing contest. Regardless of actual scores, outcomes were manipulated so that participants experienced either three successive wins or three successive losses. The primary dependent variables were expectancies for success on each competitive trial, amount of self-motivated practice during a five-minute practice period prior to each trial, and the actual performance score on each trial. The subjective importance of six causal attributions in determining the experienced outcome was also assessed. Results indicated that only the outcome variable affected expectancies and practice behavior. Expectancies increased significantly across trials with winning outcomes but remained unchanged with losing outcomes. Practice behavior decreased significantly across trials with winning outcomes but remained unchanged with losing outcomes. Achievement tendencies had a marginally significant effect on actual performance. High achievers performed at the same level regardless of the outcome, while low achievers tended to perform worse with losing outcomes than with winning outcomes ($p<.08$). Compared to low achievers, high achievers also rated their own effort as significantly more important in determining their outcomes. The expectancy and practice data indicate that the increase in expectancies which accompanies continual success may have detrimental effects on the motivation of competitors to practice. The performance data imply that the fear of failure which characterizes low achievers may reduce the quality of their performance in competitive situations where failure is experienced. The attribution data are interpreted as evidence that effort attributions mediate the more consistent performance quality of high achievers.

J. Robert Grove
Dept. of Movement Science/Phys. Ed.
Florida State University
Tallahassee, Fl. 32306

April 24, 1982
3:30 p.m.

LACK OF CORRESPONDENCE BETWEEN LEFT VENTRICULAR DIMENSIONS AND AEROBIC POWER IN TRAINED INDIVIDUALS.

C. Foster, M.B. Al-Nouri and M.L. Pollock, University of Wisconsin Medical School - Mount Sinai Medical Center, Milwaukee, Wisconsin

Echocardiographic studies have demonstrated differences in left ventricular dimensions between athletes and sedentary individuals. Longitudinal studies have demonstrated that left ventricular dimensions change in parallel with changes in maximal oxygen uptake (VO_2 max) following modifications in training. These changes in left ventricular dimensions include increases in end diastolic dimension (EDD), posterior wall thickness (PWT) and left ventricular mass (LVM). These changes suggest the hypothesis that left ventricular dimensions may determine VO_2 max. To test this hypothesis, we measured resting left ventricular dimensions using M-mode echocardiography and VO_2 max during uphill treadmill running using open circuit spirometry in 44 aerobically trained men (age 16-32) with VO_2 max ranging from 50 to 84 ml/kg x min. All subjects exercised for at least 30 min, at least 3 times weekly and at an appropriate exercise intensity, although some were elite competitive athletes and trained mucn more than this. Left ventricular dimensions demonstrated the eccentric hypertrophy typically reported for trained individuals and included the following average (± standard deviation) values: EDD = 49.4 + 4.5 mm; PWT = 10.6 ± 1.0 mm; LVM = 198 ± 47 gm. VO_2 max averaged 69.7 ± 8.4 ml/kg x min. Left ventricular dimensions, including EDD (r=0.09), PWT (r=0.09), LVM (r=0.19), LVM/kg body weight (r=0.08), LVM/kg lean body weight (r=0.02) and LVM/body surface area (r=0.04), were non significantly correlated with VO_2 max. The data indicate that cross-sectional differences in VO_2 max, with the effect of training partialed out, are not attributable to differences in left ventricular dimensions. Accordingly the hypothesis that left ventricular dimensions determine VO_2 max (and potentially represent an inherent predisposition for endurance activity) is not supported by these data.

Carl Foster, Ph.D.
Cardiac Rehabilitation Program
Mount Sinai Medical Center
Milwaukee, Wisconsin 53233

April 24, 1982
4:00 p.m.

PHYSIOLOGICAL RESPONSES OF DISABLED WOMEN TO MAXIMAL WHEELCHAIR ERGOMETRY.

Patricia I. Fitzgerald, Darlene A. Sedlock, and Ronald G. Knowlton, Southern Illinois University

A review of literature shows that there has been a recent research interest in the disabled individuals' physiological responses to wheelchair exercise. To date, few findings have reported the maximal responses of women who have utilized a manual wheelchair as their primary means of locomotion for many years. Therefore, the purpose of the present investigation was to determine the cardiorespiratory responses of such subjects during maximal wheelchair ergometry. Five disabled women (average confinement, 17.4 years) were given a multistage, discontinuous exercise test on a stationary wheelchair ergometer. Oxygen uptake ($\dot{V}O_2$), heart rate (HR), and pulmonary ventilation ($\dot{V}e$) were measured at each stage, with perceived exertion (RPE) and blood lactic acid concentration (HLA) measured at appropriate time periods subsequent to the completion of the exercise test. The mean ±SE $\dot{V}O_2$max value of 1.135±.10 L x min^{-1} was attained at a mean power output of 250±2.26 kp x min^{-1}, with a HR of 159±8.6 beats x min^{-1}. The subjective rating of RPE on the Borg scale was 16.2±1.36, and mean maximal HLA values reached 74.41±13.3 mg x 100 ml^{-1}. Whereas the ventilatory equivalent ($\dot{V}e/\dot{V}O_2$) at 55% of $\dot{V}O_2$max was 34, it was elevated to a value at $\dot{V}O_2$max of 49.95, indicating a marked respiratory stress. It was indicated by a comparison to published data for non-disabled subjects using conventional forms of ergometry that disabled female subjects have low $\dot{V}O_2$max value as well as an exceptionally higher degree of respiratory stress during maximal exercise.

Patricia I. Fitzgerald
Department of Physical Education
Southern Illinois University
Carbondale, IL 62901

April 24, 1982
4:15 p.m.

THE RELATIONSHIP BETWEEN RUNNING ECONOMY AND RACE PERFORMANCE IN A MEN'S AND WOMEN'S CROSS-COUNTRY TEAM. A. R. Wilcox and R. Bulbulian, Kansas State University

Seven men and 7 women were tested in the lab for maximal oxygen uptake ($\dot{V}_{O_2}$max) and oxygen consumption during steady-state runs on a level treadmill at speeds of 8 and 9 mph (214 and 241 m/min) for the women and 9, 10, and 11 mph (241, 268, and 295 m/min) for the men. Running economy is defined as the ability to achieve the standardized running speeds at a lower oxygen cost and was expressed in terms of oxygen consumption (ml/kg·min) and as a percentage of maximum oxygen uptake (%$\dot{V}_{O_2}$max). These values were correlated with each of three cross-country races run by the men and two races run by the women. All of the races were run in a two-week period. $\dot{V}_{O_2}$max averaged 54.5 ml/kg·min for the women and 66.3 ml/kg·min for the men. Oxygen consumption averaged 42.6 and 48.3 ml/kg·min at 8 and 9 mph for the women and 46.8, 50.8, and 56.6 ml/kg·min at 9, 10, and 11 mph for the men. Oxygen consumption at 9 mph was the same for the men and women ($t = 1.23$, $\underline{P} > 0.05$), but since $\dot{V}_{O_2}$max differed, the women were running at a higher percentage of maximum (77.8% vs. 70.2% for the men). Running economy in ml/kg·min showed no relationship with race performance in any of the meets, but the correlations were much higher between running economy as %$\dot{V}_{O_2}$max and race performance. For the men, %$\dot{V}_{O_2}$max at 10 mph had the highest correlation to race performance, with $r = 0.63$, 0.84 ($\underline{P} < 0.05$), and 0.62 for races 1, 2, and 3, respectively. For the women, %$\dot{V}_{O_2}$max at 9 mph had the higher correlation to race performance, with $r = 0.78$ ($\underline{P} < 0.10$) and 0.93 ($\underline{P} < 0.05$) to the first and second races, respectively. This study failed to support the findings of a recent report that race performance correlated with running economy (ml/kg·min) while concurring with reports that found a good correlation when running economy was in terms of %$\dot{V}_{O_2}$max. Previous reports have only investigated this relationship with one race performance. By following the same group of runners in more than one race, this study demonstrates that the relationship between running economy and race performance is not stable, since race performance will vary from race to race.

Anthony R. Wilcox
Dept. of HPER
Kansas State University
Manhattan, KS 66506

April 24, 1982
4:30 p.m.

VOLUNTEER BIAS IN RESEARCH POPULATIONS. Diane L. Spitler, G. Wyckliffe Hoffler, Donald F. Doerr, W. Carter Alexander, Paul Buchanan, Biomedical Office, NASA, Kennedy Space Center

Descriptive studies of populations, on the whole, rely upon voluntary admission for subject pools. We compared maximal aerobic capacity stress test (Bruce Protocol) data of 27 randomly selected subjects from a pool of 350 male volunteers of the Kennedy Space Center health evaluation program to 27 male base support contractor employees required to take the identical test for job assignment. The non-volunteer subjects weighed more (81.7 vs. 76.3 Kg), had a significantly ($p<.05$) higher resting and 10 min post-exercise heart rate (95.3 vs. 83.9 and 124.9 vs. 111.8 BPM respectively), higher recovery systolic blood pressure (132.3 vs. 118.2 mmHg), and lower maximal aerobic capacity when accounting for body weight (39.9 vs. 34.4 ml/kg.min^{-1}). Both groups were similar in age and occupational status. The results suggest that method of recruitment of subjects significantly influences population descriptive statistics. Volunteer recruitment results in an over-estimation of maximal aerobic capacity and/or fitness status.

We wish to acknowledge the Technical Assistance of Gene Thurston.

Diane L. Spitler, Ph.D.
Technology Incorporated
TINC-1
Kennedy Space Center, FL 32899

April 24, 1982
4:45 p.m.

COMPARISON OF DIAGNOSTIC VS FUNCTIONAL CAPACITY TESTS IN DETERMINING AEROBIC POWER IN MASTER'S RUNNERS.

M. L. Pollock and C. Foster, University of Wisconsin Medical School-Mount Sinai Medical Center, Milwaukee, Wisconsin.

When evaluating middle-aged and elderly athletes for aerobic power, the choice of test protocol can be a critical issue. A diagnostic test is essential for older athletes but may not have the specificity required to elicit a true aerobic maximum. Often, time and cost allow for only one test. The purpose of this study was to compare the results of two maximum treadmill test protocols, a diagnostic (Bruce) and continuous running protocol (Åstrand), on highly trained master's runners. The subjects were 23 men who ranged from 50 to 82 years of age (61.8 ± 9.0). The results (table) showed no significant differences between tests for maximal oxygen uptake ($\dot{V}O_2$ max), systolic blood pressure (SBP max), rating of perceived exertion (RPE), and maximal oxygen pulse (O_2 pulse). Small but significant differences between tests were found for maximal heart rate (HR max), pulmonary ventilation ($\dot{V}_E$ max) and respiratory exchange ratio (R). These data are in agreement with a previous study reported by the principal investigator (Am. Heart J. 92:39, 1976) with younger ($\bar{x}$ age = 40.5 yr) less fit subjects. Using the leveling off criterion of Taylor, Buskirk, and Henschel (J. Appl. Physiol. 8:77, 1955) (< 150 ml increase in $\dot{V}O_2$ with increased time or workload) for determining $\dot{V}O_2$ max, 87% of the subjects plateaued on the Bruce test and 93% on the Åstrand (non-significant). In conclusion, although small differences occurred between some variables the diagnostic protocol (Bruce test) can be used with good and elite older runners both for screening purposes and for determining $\dot{V}O_2$ max.

Variable	Bruce Protocol	Åstrand Protocol
$\dot{V}O_2$ max, ml/kg min	48.0 ± 7.3[a]	48.7 ± 7.4
HR max, beats/min	162 ± 13	168 ± 15*
SBP max, mm Hg	189 ± 24	193 ± 20
$\dot{V}_E$ max, L/min (BTPS)	146 ± 22	140 ± 21*
R	1.13 ± 0.06	1.09 ± 0.05**
RPE	18.7 ± 1.2	18.9 ± 0.9
O_2 pulse	20.4 ± 3.3	20.1 ± 3.0

[a] Data represent mean ± standard deviation; *p=<0.05; **p=<0.01.

Michael L. Pollock, Ph.D.
Mount Sinai Medical Center
950 N. 12th Street
Milwaukee, WI 53233

April 24, 1982
5:00 p.m.

A DEVELOPMENTAL STUDY OF SHORT-TERM MEMORY CHARACTERISTICS FOR KINESTHETIC MOVEMENT INFORMATION.

Alan A. Ashby; Andy Baez, The University of Toledo

The present experiment was designed to examine age-related characteristics of short-term retention of kinesthetic movement information. There is a considerable body of research evidence in regards to adult motor memory characteristics. This work has consistently shown that coding and retention of joint position information (i.e., location) places demands upon central processing capacity. However, the accuracy and retention characteristics of kinesthetic movement cues have not been extensively examined from a developmental perspective. Ten boys and 10 girls each from age groups 6-, 8-, and 10 years (N = 60) were tested for recall of preselected location movements on a linear slide apparatus. Sixteen trials were administered with one-half involving immediate recall and one-half involving a 15-sec unfilled delay interval. The results revealed age x retention interval interactions for all dependent variables (AE, CE, VE). Analysis on AE and VE revealed identical patterns of recall performance. Reproduction of movement position at the immediate interval was significantly less accurate and more variable for the six-year-olds than for the eight- and ten-year-olds, which were not different. Following the 15-sec delay interval there was a significant increase in recall and variability for the six-year-olds and eight-year-olds. However, there was no change in recall performance for the ten-year-olds following the delay interval. Analysis of the age x retention interval interaction for CE revealed a significantly greater positive CE at the immediate interval for the six-year-olds than for the eight- or ten-year-olds. There was no significant difference between age groups in the pattern of recall bias following the 15-sec delay interval, with all groups displaying a small positive CE. These results indicate that children as old as eight years are still deficient in central processing and/or rehearsal strategies for recall of kinesthetic position cues. Further research is needed to examine different kinesthetic cues as well as the influence of different retention interval lengths and activity conditions.

Alan A. Ashby
Physical Education Department
The University of Toledo, Ohio 43606

April 24, 1982
8:45 - 10:15 a.m.

LEISURE TIME PHYSICAL ACTIVITY AND LIFE SATISFACTION. Russell R. Pate, University of South Carolina; Jeff Dorociak, Columbia College; Steven Blair, University of South Carolina; Henry Howe and Gwyne Parker, Liberty Corporation

The psychological effects of regular physical activity are neither well documented nor understood. An increase in life satisfaction after starting an exercise program is frequently reported by participants. The purpose of this study was to examine associations between measures of life satisfaction and reported physical activity. Headquarter employees ($n=421$) of Liberty Corporation in Greenville, S.C. participated in an employee health evaluation. A medical examination was administered along with an extensive questionnaire on health habits, attitudes, and knowledge. A comprehensive leisure time physical activity questionnaire provided estimates for a physical activity index (PAI). Life satisfaction (LS) was assessed by questions on current and retrospective feelings of satisfaction. Associations between LS and PAI were examined by multiple regression modelling techniques. After controlling for effects of age, sex, race, and educational level, LS was significantly correlated with PAI ($p < .05$). Since the PAI scores were markedly skewed, analyses were repeated on log transformed data. These normalized analyses were congruent with the raw data results. Contrary to expectation, participants who reported high levels of physical activity also tended to report that they were "not too happy" at the time of the examination. Paradoxically, the individuals with high PAI reported greater satisfaction in response to the question, "How satisfied with your life were you at this time last year?" Cross-sectional analyses do not provide clarification of these apparently inconsistent findings. However, longitudinal observations of this study population, which are proceeding, may yield an explanation.

Russell R. Pate, Ph.D.
Department of Physical Education
University of South Carolina
Columbia, South Carolina 29208

April 24, 1982
8:45 - 10:15 a.m.

EFFECTS OF SELF-EFFICACY ON COMPETITIVE MOTOR PERFORMANCE AND ATTRIBUTIONS FOR FAILURE.

Anne E. Lacey, University of Iowa

This experiment was designed to investigate the effects of self-efficacy on competitive motor performance and attributions for failure. Female subjects (N=30) were randomly assigned to either a high or low self-efficacy group or to a control group. All subjects performed three practice trials and five experimental trials on a peg board task with a confederate. In the high self-efficacy condition, efficacy was manipulated by reporting slower times to the subjects. In the low self-efficacy condition, faster times were reported to the confederates and slower times to the subjects. There was no efficacy manipulation in the control group. During the competitive phase, the outcome was manipulated so that all subjects lost four of the five trials. A multivariate comparison of the three groups on three pre-experimental expectancy measures (ability rating, predicted time, and predicted number of winning trials) yielded a significant difference ($p<.001$). High self-efficacy subjects predicted more winning trials and rated their overall ability higher than either low self-efficacy or control subjects. A MANOVA on the same three expectancy measures after all subjects had lost four of the five experimental trials revealed no group differences. Apparently, the actual experience of failure in competition was powerful enough to eliminate the pre-experimental efficacy differences. A MANOVA on the post-experimental causal attributions revealed no group differences. Furthermore, the groups did not differ in performance times during the practice or experimental trials.

Anne E. Lacey
Dept. of Physical Ed. & Dance
University of Iowa
Iowa City, IA 52242

April 24, 1982
8:45 - 10:15 a.m.

PERCEIVED COMPETITIVENESS, SKILL AND SCORES ON THE SPORTS ATTITUDES INVENTORY.

Joe D. Willis, Georgia State University; Benjamin H. Layne, Georgia State University

Designed as a validation study of a questionnaire measure of competitiveness, this study attempted to determine if power, fear of failure and achievement motive scores were predictors of coaches' ratings and self ratings of competitiveness. Thirty-nine female subjects who were members of three athletic teams were administered Form B of the Sports Attitudes Inventory, which is a sport-specific instrument designed to measure three competition-related motives. Subjects rated themselves on competitiveness and skill using the self-peer measurement technique. Coaches' ratings of competitiveness and skill were also obtained. Coaches' ratings of competitiveness correlated .77 with coaches' skill ratings, .69 with self-peer ratings of competitiveness, .38 with subjects' power motive scores and .25 with fear of failure. Athletes' self-perceptions of competitiveness correlated .62 with Coaches' ratings of competitiveness. Results of a stepwise regression analysis revealed that the coaches' skill rating was the most important predictor of the coaches' competitiveness rating (criterion variable). Other important predictor variables in the regression equation were the self-peer measure of competitiveness, power motive, fear of failure. An additional regression analysis was performed using the self-peer measure of competitiveness as the criterion variable which found coaches' ratings of competitiveness and fear of failure scores to be the best predictors. Results indicated that major differences may exist in the ways in which athletes and coaches perceive competitiveness. Results also lend support to the validation claims for the measure of power and fear of failure but do not appear warranted for the achievement motive scale.

Joe D. Willis, Ph.D., Chairman
Department of EPRD
Georgia State University
Atlanta, Georgia 30303

April 24, 1982

8:45 - 10:15 a.m.

EFFECT OF SITUATION CRITICALITY ON MALES AND FEMALES PERFORMING A MOTOR TASK. Robert Weinberg, Peggy Richardson, Allen Jackson, North Texas State University

Previous research has indicated that males and females react differently in achievement-oriented activities (Lenney, 1977). It was the purpose of the present investigation to determine if males and females react differently (or the same) in terms of subsequent performance when faced with being ahead or behind in a competitive situation. Male and female subjects (N=80) competed back-to-back on a leg extension task which required them to hold the position as long as possible. Subjects were informed that they would compete for two trials (one with each leg), and the individual with the longest overall time for holding out his/her leg would be declared the winner. However, one of the subjects was always a confederate and the competition was rigged. The naive subjects were thus randomly assigned to one of the following conditions: (1) Slightly Ahead (11 sec.), (2) Slightly Behind (11 sec.), (3) Way Ahead (41 sec.), (4) Way Behind (41 sec.). This feedback was provided after the first trial and at this time subjects completed an attributional questionnaire. Manipulation checks demonstrated the effectiveness of the situation criticality manipulation. Results indicated no significant performance differences on Trial 1 before the manipulation and therefore a 2 x 2 (sex x ahead/behind) ANOVA was conducted using Trial 2 scores. Results revealed a significant ahead/behind main effect, and Newman Keuls post hoc tests indicated that the slightly- and way-behind conditions produced significantly better performance than the slightly- and way-ahead conditions. Causal and trait attributions were analyzed by two separate MANOVA's. The only significant finding was an ahead/behind main effect for the causal attribute of task difficulty, with subjects in the ahead condition viewing task difficulty as a more important determinant of performance than subjects in the behind condition. The lack of sex differences in performance might be attributed to the back-to-back competition, since this made competition against oneself more salient than competition against the opponent. In addition, pilot testing indicated that the leg extension task was considered neutral (i.e., neither masculine or feminine), and perhaps sex differences would only occur when tasks are either masculine or feminine. Further studies in field settings are necessary to simulate the complex social milieu under which competition usually occurs.

Robert Weinberg
Physical Education Division
North Texas State University
Denton, Texas 76203

April 24, 1982
8:45 - 10:15 a.m.

EFFECT OF VISUO-MOTOR BEHAVIOR REHEARSAL ON KARATE PERFORMANCE.

Thomas Seabourne, Robert Weinberg, Allen Jackson, North Texas State University

Recently Suinn has developed a technique termed (VMBR) which has been shown to be an effective tool in improving athletic performance (e.g., Suinn, 1976; Weinberg & Seabourne, 1981). However, it is not clear whether VMBR should be practiced daily or whether a single exposure to VMBR can also enhance athletic performance. To answer this question, two independent experiments were conducted. In experiment 1, subjects (N=18) were assigned to either a VMBR practice or no practice (single exposure to VMBR) condition. The practice group trained daily for six weeks while the no practice group was exposed to VMBR on the final testing session only. In actuality the no practice groups in both experiments were placebo controls since they were given special exercises and instructions while the practice group received VMBR training. Karate performance tests as well as state-trait anxiety tests were administered at the beginning and end of the 6-week period. Results showed a condition x trials interaction for state anxiety, with the VMBR group exhibiting a significantly greater decrease in state anxiety over time than the no practice group. Results also revealed a trait anxiety main effect, with both groups displaying significant decreases in trait anxiety over the six-week period. However, no effects were found for performance. In experiment 2, subjects (N=14) were taken through the same procedure as experiment 1 except for the timing of VMBR exposure for the no practice group. The no practice group was given VMBR on the first day of class. However, the instructor did not give any feedback or reinforcement for VMBR training techniques to the no practice group. This was done to simulate what many coaches often do when introducing a new psychological technique. That is, they give it to the athletes once but never follow-up in any systematic way. The practice group again trained daily for six weeks. Results again indicated a decrease in trait anxiety for both VMBR groups. In addition, results produced a significant conditions main effect, with the VMBR practice group exhibiting higher performance than the no practice group. The results of these two experiments are discussed in terms of the relationship between state anxiety and performance as well as the temporal location of VMBR training. It is suggested that more longitudinal controlled studies using VMBR are needed to more fully understand the conditions and situations under which VMBR can be most effective in enhancing performance.

Thomas Seabourne
Department of Physical Education
North Texas State University
Denton, Texas 76203

April 24, 1982
8:45 - 10:15 a.m.

AN EXAMINATION OF THE LEADERSHIP BEHAVIORS OF SELECTED SUCCESSFUL BASKETBALL COACHES AT FOUR COMPETITIVE LEVELS.

Robert W. Case, College of Great Falls, Montana

The purpose of this study was three-fold. First, to identify the leadership behaviors, as measured by the Leader Behavior Description Questionnaire (LBDG), of selected successful junior high, senior high, college, and Amateur Athletic Union head basketball coaches. Second, to determine if any significant differences exist between successful coaches from each competitive level on the leadership dimensions of initiating structure and consideration. Third, the results were interpreted in terms of Hersey and Blanchard's (1977) Situational Leadership Theory and Carron's (1980) modification of the Situational Leadership Theory. A random selection of forty successful head coaches and their teams participated in this study with a total of three hundred and ninety-nine players completing LBDQs pertaining to their head coaches. Coaches were also administered a Coaches' Personal Data Questionnaire in order to obtain demographic and situational information. In order to achieve the stated purposes of this study, twelve null hypotheses were formulated and tested. Analysis of variance (nested) was the statistical procedure used to test for significant main effects between coaches' scores on the LBDQ and competitive level. Significant differences were found between junior high and senior high, junior high and A.A.U., senior high and A.A.U., and college and A.A.U. basketball coaches on initiating structure scores. Significant differences were found between junior high and college, senior high and A.A.U., and college and A.A.U. basketball coaches on consideration scores. A consistent pattern of leadership behavior was identified which included low task and high consideration styles at the junior high and A.A.U. levels and high task and low relation styles at the senior high and college levels. These findings were not consistent with patterns proposed by Hersey and Blanchard (1977) in their Situational Leadership Model. However, the results did partially support Carron's (1980) modification of the Situational Leadership Model.

Robert W. Case
Dept. of Physical Education
College of Great Falls
Great Falls, Montana 59405

April 24, 1982
8:45 - 10:15 a.m.

MANAGEMENT STYLES OF COLLEGIATE BASKETBALL COACHES. Charles W. Jackson, Old Dominion University; Sara Jane Blake, Old Dominion University; Paul Heine, Old Dominion University

The purpose of this study was to assess leadership styles employed by female and male collegiate basketball coaches. A Managerial Style Questionnaire (MSQ) adapted from the work of McBer was administered to twenty-two female and twenty-three male coaches from Region II of AIAW. Additional background information of sex, years of coaching experience, and overall win/loss records was collected. Initial Sex by Coaching Experience factorial ANOVA with each of the six management styles indicated significant sex differences along three of the dimensions. The more positive styles of "Coach" and "Democrat" were significantly in favor of the females. On the other hand, males were more dominant on the "Coercer" scale. In order to get a multivariate view of the six styles, along with sex and experience, on the criterion of winning percentage, a step-wise multiple regression analysis was performed. The obtained $R = .749$ ($R^2 = .561$) indicated that negative management styles accounted for 43.3 percent, coaching experience accounted for 6.8 percent, positive management styles accounted for 4.8 percent, while sex only accounted for 1.2 percent of the total variance, respectively. This initial study shows promise for using the adapted Managerial Styles Questionnaire (MSQ) for sports settings. In addition, the saying "nice gals or guys finish last" is supported by the results of this study. Additional research is suggested for the instrument, as well as wider sampling from various sports and levels.

Charles W. Jackson
Human Performance Laboratory
Old Dominion University
Norfolk, VA 23508

April 24, 1982
8:45 - 10:15 a.m.

ANXIETY, SELF-PERCEPTION AND SWIMMING PERFORMANCE

Thomas J. Sheeran, Niagara University

The purpose of this study was to examine the relationship between state anxiety, self-perception, and swimming performance. Spielberger's State-Trait Anxiety Inventory (STAI) was administered to ten male varsity intercollegiate swimmers five minutes prior to each of eleven (11) consecutive contests. Following completion of the item STAI (Form X-1), the swimmer rated himself on how well he thought he would perform in that day's meet. Two days following the contest, a swimmer rated how well he thought he had performed in the previous meet. Self-ratings were made on a continuum of good (3 points) to poor (1 point). Data were analyzed through regression procedures. The two predictor variables, state anxiety and self-perception, were initially correlated with the dependent variable, swimming performance. These correlations were found to be positive and highly significant at the .01 level (.302, .470 respectively). Stepwise regression indicated that self-perception accounted for 22.1 percent of the total variance. State anxiety scores, however, explained only 9.1 percent of the total variance. When these factors were combined, 26.5 percent of the total variance in swimming performance was accounted for. Although state anxiety is thought to be a significant predictor of performance, these data indicate that a swimmer's perception of how he thinks he will perform is a far more powerful indicator of his actual performance than previous research has reported.

Thomas J. Sheeran, Ed.D.
Niagara University
4661 Apple Drive
Lewiston, New York 14092

April 24, 1932
8:45 - 10:15 a.m.

CARDIO-RESPIRATORY AND PERCEIVED EXERTION RESPONSES TO DIFFERENT BODY POSITIONS DURING MAXIMAL ARM ERGOMETRY. Richard G. Israel, East Carolina University; Marjorie L. Leppo and Vernon Bond, Howard University; Charles O. Dotson, University of Maryland

Arm ergometry represents a mode of aerobic training for many individuals with lower extremity disabilities. Initial maximal arm ergometry stress test evaluations of paraplegics would enhance the safety and efficiency of these arm training programs. The purpose of this study was to compare cardio-respiratory and perceived exertion (RPE) responses to 3 body positions (upright, sitting, or supine) during maximal arm ergometry in order to determine the most efficient position for maximal testing. Twelve healthy male subjects (age 19-30) performed continuous arm ergometry (Monarch Model 880 Rehab Trainer) exercise tests in the 3 body positions. The initial load for the test was 75 kgm/min and was sequentially increased every 2 minutes by 75 kgm/min until the subject could no longer maintain a 50 rpm cranking rate. HR was recorded from the ECG and $\dot{V}O_2$, $\dot{V}E$, and respiratory frequency (R) was obtained using the Beckman Metabolic Cart. Borg's 15-point graded category scale was used to obtain the rating of perceived exertion. All values were measured each minute during exercise and for 5 minutes of recovery. Treatment order was randomized and performed on separate days. A tendency of the subjects to match R with the cranking rate was observed in all positions. A one-way repeated measures ANOVA yielded significant ($p<.01$) differences across positions for HR max, $\dot{V}O_2$ max, O_2 pulse and total endurance time. Newman-Keuls post hoc analyses indicated that $\dot{V}O_2$ max, $\dot{V}E$ max, and O_2 pulse max obtained in the sitting position were significantly ($p<.01$) higher than for the upright or supine positions. HR max was significantly ($p<.01$) lower in the supine position than in both the standing and sitting positions. There was no significant difference across positions for RPE. Since no differences existed in RPE between positions and higher metabolic data was obtained in the sitting position, the authors concluded that the sitting position was the most appropriate position for continuous maximal arm ergometry exercise testing.

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Richard G. Israel
Human Performance Lab-HPERS
East Carolina University
Greenville, NC 27834

April 24, 1982
8:45 - 10:15 a.m.

AN INVESTIGATION OF THE DEVELOPMENTAL TREND OF BODY IMAGE IN CHILDREN'S ESTIMATES OF BODY DIMENSION, MOTOR PERFORMANCE AND SELECTED MOTOR SKILLS. Conrad Milne, New Mexico State University, Las Cruces; Ruth Vasiliadis, University of Western Ontario, London, Canada

This study investigates the postulate of a developmental trend of body image across age groups evaluated through body dimension and motor performance estimates. A secondary focus examined the theoretical relationships of body image with selected motor performance skills. One-hundred and thirty-one children, 68 males and 63 females, aged 5, 7, 9, and 11 years, were tested on three body image variables: 1) body dimension estimates in the horizontal plane (shoulder width and span, head width, chest depth) and the vertical plane (standing, extended and sitting height); 2) motor performance estimates (standing and running long jump, jump and reach); and 3) performance on three selected motor performance skills (30 yard dash, baseball throw for distance, dynamic balance). An ANOVA statistical technique was employed to analyze for source of variation on a two (sex) by four (ages) design with Newman-Keuls tests for post hoc analyses. Pearson Coefficients were calculated among the variables. The data were examined in two modes: absolute scores to determine magnitude of error, algebraic scores to determine the direction of error in making estimates of body dimensions and motor performance. The results indicated a significant difference ($p < .05$) in magnitude of error in most body dimensions and motor performance estimates between the 5 year olds and the remaining 7, 9 and 11 year olds. The algebraic analysis indicated a general over-estimation of body dimensions by 5 year olds and under-estimations by the older children. There were no general trends in reference to sex differences. Although significant ($p < .01$) individual correlations were found, no consistent correlation coefficients were indicated between body dimension estimates, performance estimates or motor skill performance. Results seemed to point to a "good enough" level of knowledge of one's body image between 7 and 9 years of age in magnitude of error. Direction of estimates suggested that consistency occurred between 9 and 11 years of age. The postulate that there may be a motoric base to the development of body image may be only that, a base, not a continued factor throughout the ages studied as there was not sufficient evidence of a correlation between body image and motor skills.

Conrad Milne, Ph.D.
Dept. of Phys. Educ., and Recreation
New Mexico State University
Las Cruces, New Mexico 88003

April 24, 1982
8:45 - 10:15 a.m.

ISOTONIC MUSCULAR ENDURANCE ASSESSMENTS OF COLLEGE-AGED MALES ON THE UNIVERSAL GYM.

Robert W. Patton, Robyn Strader, and Allen Jackson, North Texas State University

Several investigators have utilized ergometric techniques in laboratories to measure isotonic muscular endurance by utilizing various percentages of maximal voluntary contractions of muscle groups. Investigations of field tests of isotonic muscular endurance have frequently utilized calisthenic-type exercises which potentially result in assessments of strength among weaker subjects and assessments of endurance among stronger subjects. The purpose of this investigation was to study a field testing model of isotonic muscular endurance recommended by Wilmore in which various percentages of one repetition maximum (1RM) on twelve stations of the Universal Gym was utilized for exercises involving upper extremities, trunk and lower extremities. Pilot studies revealed that different percentages of 1RM are required to produce fatigue at a repetition range of 15-25 reps for the upper extremity (70%), trunk (50%-80%), and lower extremities (50%-90%). The reliability of these tests ranged from r = .83 to .92. Lactate studies, performed four minutes post-exercise, clearly revealed lacticacidimia (116.1 ± 3.6 mg %) and supported the logical validity of the isotonic muscular endurance assessment technique. Scores obtained from 151 males (18-30 years) on each of the twelve exercise stations were then analyzed by computer and indicated no clear factor structure for the construct. Each exercise was therefore viewed as an independent measure. Moreover, each measurement was uncorrelated with body weight. Body weight adjustments for evaluating performance were not necessary. Norms were subsequently developed for each exercise station on the Universal Gym. Percentile norms will be available. The findings of this study yielded a valid and reliable method of assessing isotonic muscular endurance among college-aged males on a commonly available testing and training device in the field setting.

Robert W. Patton
Division of Physical Education
North Texas State University
Denton, Texas 76203

April 24, 1982
10:30 a.m. - 12:00 noon

EFFECTS OF EXPERIMENTAL DESIGN AND OBJECT SIZE ON OBJECT RECEPTION BY CHILDREN IN THE FIRST GRADE.

V. Gregory Payne, California State Polytechnic University/Pomona

The purpose of this study was to examine the effects of experimental design and object size on object reception by young children. 24 boys and 24 girls from the first grade (between-subjects design group) were required to make a series of 12 catches using only one ball size (6-, 8.5-, or 10-in. diameter). Another group comprised of 8 boys and 8 girls was administered 36 trials which consisted of all 3 ball sizes presented in a random order (within-subjects design group). Each catch was evaluated using a five-point scale. Following an analysis of the between-subjects group data it was determined that a significant ball size by sex interaction existed. Following a similar analysis of the within-subjects group data it was determined that the factor of ball size for these subjects was significant. When contrasting the two design types an analysis of variance was employed followed by a Satterthwaite approximation. It was determined that no significant difference existed between these design types. They do, therefore, appear to be interchangeable for this particular paradigm.

V. Gregory Payne
Department of Physical Education
Calif. St. Polytechnic Univ./Pomona
Pomona, CA 91768

April 24, 1982
10:30 a.m. - 12:00 noon

INFLUENCE OF CALIPER, INVESTIGATOR, AND PREDICTION EQUATIONS ON BODY FAT ESTIMATES IN FEMALE COLLEGE ATHLETES.

M.H. Slaughter, T.G. Lohman, University of Illinois, Urbana-Champaign; M.L. Pollock, University of Wisconsin, Milwaukee; J. Brandon and R.A. Boileau, University of Illinois, Urbana-Champaign

This study was designed to evaluate the effects of skinfold calipers, investigator techniques, and various prediction equations for estimating body fatness in college-aged female athletes. Sixteen college women basketball players were measured at five skinfold sites by four investigators using four skinfold calipers (Lange, Adipometer, Harpenden, Holtain). Significant differences were found for instrument, investigator, and interaction of instrument with investigator for each of the five skinfold sites. Considerably lower values were found in all sites for the Harpenden and Holtain than for the Lange. An average difference of 5.5 mm between the Holtain and Lange across all sites and investigators highlights the extent of differences found among instruments. The average difference among investigators varied from 1.0 mm to 6.6 mm depending on the site. Expected mean squares were calculated for each site to compare the magnitude of the source of variation. Instrument and investigator accounted for only 7.9% for the subscapular and 3.5% for the suprailiac site. All investigators and instruments were correlated with a reference standard (one investigator with one caliper), and technical errors were computed. Correlations were, in general, above .95 for triceps, subscapular and abdomen but somewhat lower for the suprailiac and thigh. Technical errors were highest for abdomen and thigh. Based on this study, triceps and subscapular sites appear to be measured with the highest objectivity. A final analysis was conducted using percent fat from several equations in the literature on college females. The mean percent fat for the sample was found to vary from a low of 14.1% to a high of 30.6% depending on the investigator, instrument, and equation selected from the literature. It was concluded that in using the equations from the literature on college females careful attention must be given to the description of sites measured, instruments used, and population upon which the equation was derived if large systematic errors are to be avoided.

M. H. Slaughter
Physical Fitness Research Laboratory
906 S. Goodwin Ave.
Urbana, Illinois 61801

April 24, 1982

10:30 a.m. - 12:00 noon

AN ANALYSIS OF THE SLOPE AND INTERCEPT OF THE HICK-HYMAN LAW.

Donald Siegel, Smith College

The purpose of this study was to determine the validity of a number of hypotheses posed by Keele (1973) regarding the relationship between information load and reaction time identified by Hick (1952) and Hyman (1953). Based on Hyman's four subjects, Keele noted that there was no relationship between the slopes and associated intercepts of the linear regression equations of reaction time on information load, and that therefore, one might suggest that these components assess different underlying mechanisms. As a hypothesis he proposed that the slope may reflect the efficacy with which a subject retrieves information from memory, while the constant may reflect sensory-motor quickness. The present study generated linear regression equations of reaction time on information load for 39 individuals. A Pearson correlation was run to determine whether for a larger group of subjects independence of slopes from intercepts could be replicated. Individuals were also evaluated on a card sorting task and rotary pursuit, tests requiring sensory motor quickness and the retrieval of information from memory, in order to determine whether performance variability could be associated with components of the regression equations. Surprisingly, the results showed a moderately high inverse relationship between a subject's slope and constant ($r(37)=-.72$, $p<.01$). Furthermore, principal components factor analysis with varimax rotation demonstrated that regression components, card sorting scores, and pursuit rotor times loaded most heavily in different factors. Based on the data and analyses of the present study, it was concluded that Keele's interpretation of the Hyman data needs revision. In addition, the factor analysis indicated that task variability was relatively specific and that the slope and intercept of the reaction time equation were not associated with decision time in card sorting or time on target of the pursuit rotor.

Donald Siegel
Department of Physical Education
Smith College
Northhampton, MA 01063

April 24, 1982
10:30 a.m. - 12:00 noon

DEVELOPMENTAL VARIATIONS IN AGONIST-ANTAGONIST MUSCLE INTERACTION WITH SKILL ACQUISITION. Richard Engelhorn, Bradley University

The purpose of the present research was to investigate developmental differences in the organization of simple timed positioning movements as reflected by electromyographic (EMG) parameters. Twenty-seven children participated as subjects in the research, nine each of the following ages: 7 (mean=7.2), 9 (mean=9.3), and 11 (mean=11.3). Each child performed sixty trials of an 800 millisecond (msec) horizontal elbow flexion movement through sixty degrees angular rotation. Subjects' arm movements were monitored using a potentiometer linked to the movement apparatus and were represented on an oscilloscope screen by a diagonally moving dot. A template on the screen provided visual feedback of response performance. On trials 7 to 12 and 55 to 60, no visual feedback was provided in order to assess the level of skill acquisition. Bipolar surface EMG activity was recorded from the biceps brachii and triceps brachii muscles during trials 1 to 12 and 49 to 60. The EMG and kinematic data were online digitized at a 1000 Hertz sampling rate using an Apple II plus microcomputer system. The dependent variables for the statistical analyses were the root mean square EMG activity data calculated over 50 msec intervals both prior to and following movement initiation. Angular displacement and mean velocity error scores indicated that subjects did learn the movement task. Analyses of covariance using the biceps and triceps brachii muscle EMG activity data, with the mean velocity as the covariate, revealed significant changes in the EMG patterns. All groups showed a decrease in biceps EMG activity during the last 500 msec of the movement. However, the pre- and early post-movement EMG data reflect a more complex pattern of change over trials. The triceps EMG activity data also revealed significant modifications with age and learning. The results from the 11-year-old group indicated an increase in the triceps EMG activity over trials during the latter 300 msec of the motor responses, whereas this change was not present for the two younger groups. It is suggested that the observed variations in agonist and antagonist muscle control relate to differences in the use of response feedback for learning and performance.

Richard Engelhorn
Department of Physical Education
Bradley University
Peoria, Illinois 61625

April 24, 1982
10:30 a.m. - 12:00 noon

EFFECTS OF INTRAMODAL AND INTERMODAL MANIPULATIONS ON LEARNED KINESTHETIC LOCATION INFORMATION.

T. Gilmour Reeve and Robert Mainor, Auburn University

Intramodal performance errors in the kinesthetic modality have been found when movement direction was changed, and intermodal performance errors have occurred when visual feedback was provided following learning in the kinesthetic modality. Previous studies have indicated that contextual effects associated with encoding movement information may be the cause of these errors. This study compared the effects of intramodal and intermodal manipulations on learned kinesthetic location information within a single experiment. Forty blindfolded subjects learned to move in a right to left direction on a linear slide to a criterion location (50 cm, midline of the body) during 21 knowledge of results (KR) trials. After the KR trials, one-half of the subjects switched movement direction and one-half of the subjects in each movement direction were provided visual feedback. Subjects had 6 no KR trials in the experimental conditions and then were returned to the original learning conditions for 3 more no KR trials. CE and VE were analyzed in a 2 x 2 x 2 (Direction x Feedback x Blocks of Trials) ANOVA for the first no KR trials. Results indicated that subjects who switched direction and/or feedback estimated the criterion location to be left of the midline of the body. Also, subjects who did not change movement direction were more consistent than those who did change. Analyses of CE and VE for the return to original learning condition trials revealed no significant differences. Equivalent CE performances for intra- and intermodal manipulations supported the notion that both types of errors are due to contextual effects operating during learning. The similar performances of the groups when returned to the original learning conditions indicated that the subjects' memory representations of the correct response were not altered during the experimental manipulations.

T. Gilmour Reeve
HPER
Auburn University
Auburn, Alabama 36899

April 24, 1982
10:30 a.m. - 12:00 noon

RULE FORMATION IN A RAPID TIMING TASK: A TEST OF SCHEMA THEORY.

Susann G. Doody, University of Northern Iowa; Howard N. Zelaznik, Purdue University

The purpose of this study was to test the proposal of Schmidt's (1975) schema theory that the learning of discrete motor skills involves the development of a recall schema. The recall schema is proposed as a rule which relates response specifications to response outcomes. Eight independent groups (N = 12 per group) were used in a 2x2x2 factorial design. Each of the groups experienced one combination of the treatment factors of Variability of Practice, Linearity of Force-velocity Relationship, and Location of Transfer. Linear groups practiced with the normal, linear, force-velocity relationship. An artificial quadratic relationship was induced for the non-linear groups by adding different masses to the slide for different movement distances. Constant groups practiced at only a 40 cm distance. Variable groups practiced at 10 cm, 20 cm, 25 cm, 35 cm, and 40 cm. All groups were given 60 training trials in which to learn to execute a linear movement in 200 msec. Subjects then executed 21 transfer trials either to a distance inside the range of practice (30 cm) or outside the range (47.5 cm). Analysis of AE scores during training revealed that all groups improved during practice, but that constant practice groups improved more than variable practice groups. No main effects were significant for AE during the transfer phase. As mean AEs during transfer were quite small, both variable and constant practice conditions produced learning as measured by AE. It was predicted that only the non-linear, constant practice groups would develop a recall schema based on misleading information and respond with too much force on transfer to a new task. As predicted, only those groups produced negative CE during the transfer trials. Analysis of CE revealed significant main effects of practice variability and rule linearity as well as significant higher order interactions. The results suggest that AE during transfer to a similar task is not the only measure, and perhaps not the best measure, of schema development. That only subjects given with artificial and incorrect information on which to develop a recall schema produced systematic negative bias on transfer provides direct evidence of the formation of a rule which relates applied force to the resulting movement velocity.

Dr. Susann G. Doody
School of HPER--West Gymnasium 209A
University of Northern Iowa
Cedar Falls, IA 50614

April 24, 1982
10:30 a.m. - 12:00 noon

CORRELATES OF ATTITUDES TOWARD HOMOSEXUAL BEHAVIOR. Michael Young, University of Arkansas; Jean Whertvine, Bland, Missouri

The purpose of this study was to determine the relationship of attitudes toward and participation in selected sexual activities to attitudes toward homosexual behavior among heterosexual university students. Subjects for the study were students enrolled in a freshman level course (required within the College of Education) at a major southern university. The subjects voluntarily completed, in a classroom setting, a questionnaire concerning their attitudes toward and participation in selected sexual behaviors. Attitude toward a behavior was assessed through the use of a five-item, seven-point sematic differential for each behavior. Participation in a behavior was scored on a one-four basis: (1) never participated in this behavior, (2) have participated at least once but this has been more than a year ago, (3) have participated in the last year with one partner only, (4) have participated in the last year with more than one partner. Only responses from students who indicated that they considered themselves to be exclusively heterosexual and who indicated that they had never participated in oral sex or other sexual activity with a person of their gender were included in the study. This resulted in 190 questionnaires available for analysis. Data were analyzed utilizing stepwise multiple regression. The seven independent variables selected as making the greatest contribution toward explanation of the variation in attitude to homosexual behavior were (in order of selection): Attitude toward receiving oral sex (partner opposite gender), participation in receiving oral sex (partner opposite gender), class in school, attitude toward administering oral sex (partner opposite gender), participation in administering oral sex (partner opposite gender), attitude toward heterosexual intercourse and gender of respondent. Each of these items made a significant ($\alpha = .01$) contribution toward the explanation of the variance in the dependent variable. As a set, the variables accounted for just over 22 percent of the variance ($R^2 = .225$). Results of the study indicate that gender, class and attitudes toward and participation in selected sexual activities are statistically significant correlates of attitude toward homosexual behavior.

Michael Young
Department of Health Education
University of Arkansas
Fayetteville, Arkansas 72701

April 24, 1982
1:15 - 2:45 p.m.

CORRELATES OF EXPECTED FUTURE USE OF TOBACCO AND ALCOHOL AMONG ELEMENTARY SCHOOL CHILDREN.

David Foulk and Michael Young, University of Arkansas

The purpose of the study was to identify correlates of expected future use of tobacco and alcohol among elementary school students. A total of 522 first, third and fifth grade children from four elementary schools located in four different cities in Arkansas served as subjects for the study. Each child was interviewed individually,with their responses recorded on audio tape. In addition to general background questions,each child was asked the following questions concerning tobacco and alcohol products. The questions asked were: (1) Do you recognize the items pictured? (For tobacco, the children were shown a picture which included several types of alcohol beverages including beer, wine and "hard" liquor.) (2) Do you know someone who uses these types of products? (3) Do you use, or have you used,these types of products? (4) Do you expect you will use these types of products used at home? Answers to expected future use were classified into three categories: (a) a firm yes, (b) a firm no, and (c) all other answers such as, "I don't know" and "maybe". Answers to all other questions were either yes or no. In order to identify correlates of expected future use of tobacco and alcohol, the SPSS subprogram crosstabs were utilized to analyze the data in a series of 2X3 contingency tables. It was found that significant relationships ($\alpha=.05$) existed between expected future use of tobacco and (1) personal use and (2) having seen the product used at home. Data were futher analyzed controlling first for grade level and then for whether or not the child lived with one or both parents. It was found that the relationship between expected future use of tobacco and personal use was significant at the first grade level and when the child lived with both parents. Thr relationship between expected future use of tobacco and whether or not the student has seen the product used at home existed at both the first and fifth grade level and when the student lived with both parents. Significant relationships were also found between expected future use of alcohol and (1) knowing someone who used alcohol, (2) personal use and (3) having seen the product used at home. Reanalysis of these findings revealed that the relationship between expected future use of alcohol and all three preceding variables was significant at all grade levels and regardless of whether the child lived with one or both parents.

David Foulk and Michael Young
University of Arkansas, Women's Gym
Fayetteville, Arkansas 72701

April 24, 1982
1:15 - 2:45 p.m.

CPR RECERTIFICATION (BASIC CARDIAC LIFE SUPPORT): THE STATE OF THE ART. Vicki Cleaver, Ed.D., Health, Physical Education, and Recreation Department, University of Oklahoma, Norman, OK

The purpose of this study was to find out if any institution or agency-based affiliate which certifies persons in CPR (Basic Cardiac Life Support) has any type of special recertification program. Since CPR certification is current for only one year, the investigator wanted to know if there was any special emphasis on recertification or if the emphasis was on original certification. A telephone survey was conducted to a random sample of institutions and agency-based affiliates across the United States to determine if they had any special, organized emphasis for recertification. Data were collected on the number of persons who received CPR certification and compared with the number of persons who returned after one year to be recertified. Findings indicate that the major emphasis is on first-time certification. The investigator found no states which had a planned, organized recertification program. Of the schools and agencies contacted, Oklahoma City was the only agency which at least attempted to get citizens recertified. A postcard was sent to each individual notifying him that his first year certification had expired and encouraged the individual to take another course to keep certification current. In Oklahoma City, of 20,000 persons certified in CPR in one year, only 5% of that 20,000 returned for certification. The conclusion was drawn that relatively little is being done to keep the population current on resuscitative techniques after an initial CPR class. Most of the efforts are directed towards the initial instruction of citizens.

Vicki Cleaver, Ed.D.
Health, Physical Education, and
Recreation Department, Univ. of Okla.
Norman, OK

April 24, 1982
1:15 - 2:45 p.m.

DEATH ANXIETY AS RELATED TO ATTITUDES TOWARD PHYSICAL FITNESS AND LOCUS OF CONTROL IN COLLEGE STUDENTS.

Jo A. Carter, Louisiana State University, Baton Rouge

The purpose of this study was to examine the relationship of attitudes toward physical fitness and locus of control to death anxiety in college students. Seventy-four females and 63 males with an average age of 20.2 were administered the Templer Death Anxiety Scale, the Attitude Toward Physical Activity Inventory and the Rotter Internal-External (I-E) Control Scale. Data were analyzed by the Maximum R^2 Criterion with fitness attitudes and I-E scores as predictor variables. Death anxiety was the dependent variable. Because it has been suggested that sex moderates the relationship between I-E scores and other behaviors, separate regression analyses were computed for males and females. The multiple regression analysis for females yielded an R^2 of 0.269 for the linear model $F(2,71) = 13.09$, $p < .001$. However, only locus of control significantly contributed to the prediction, $F(1,71) = 25.43$. As scores on the I-E Scale moved toward an external belief system, death anxiety increased. In the sample males, neither locus of control nor attitudes toward physical fitness were related to death anxiety. Even though fitness attitudes failed to predict death anxiety in either gender, this dimension correlated negatively with externality (-.22) for females. Findings suggest that death anxiety reflects concern over the inability to control or predict outcomes for females but not for males. Further, while the results for females were statistically significant, the relationship was modest which suggests that much of the variance must be accounted for by other variables. Obviously there are many complex determinants of death anxiety with sex differences, perhaps, being one.

Jo A. Carter
School of HPERD
Louisiana State University
Baton Rouge, LA 70803

April 24, 1982
1:15 - 2:45 p.m.

POSITIVE LIFESTYLE PROJECT FOR EIGHTH GRADE HEALTH EDUCATION.

John A. Bonaguro, Ohio University; Maureen McLaughlin, Zanesville/Muskingum County Health Dept.; Karen Sussman, Zanesville/Muskingum County Health Dept.

The purpose of this project was to demonstrate the effectiveness of a wellness-oriented health education/risk reduction program upon health locus of control, self-esteem, and health attitudes and behaviors of eighth grade students in Zanesville city schools. Metholodogy: There were ten health education classes at two middle schools which participated in the study. Five classes were randomly assigned to experimental and control groups. The experimental and control groups received the regular health education curriculum designed by the Zanesville schools except the students in the experimental group also completed a Positive Lifestyle Project (PLP). The PLP was completed over a twelve-week time period. Pre- and posttest questionnaires were administered to the experimental and control groups. The questionnaires contained scales which measured smoking and alcohol behavior, Health Locus of Control, Self-Esteem, Attitude Toward Smoking, and Attitudes Toward Health Education. ANOVA procedures were used to test for the effects of the PLP. The Scheffé test and Planned Orthogonal Comparisons were calculated at the .05 level of significance. Results: A total of 156 usable questionnaires were collected from the experimental (N=74) and the control (N=82) groups. An analysis of smoking and alcohol drinking behaviors revealed an increase in the number of students practicing preventive health behavior. Planned orthogonal comparisons and Scheffé test revealed significant differences between experimental and control groups on self-esteem. Planned comparisons between Pre/Post control score on the effects of smoking showed a significantly lower attitude score in favor of smoking while experimental group showed a significantly higher attitude score toward not smoking. Experimental group had significantly higher score than the control group on attitude toward the hazardous effects of smoking. Scheffé test for attitude toward Health Education was significant between posttest experimental and posttest control comparisons. Conclusions: The students in the experimental programs showed significant differences on self-esteem than students in the control group. The PLP was considered an effective method for influencing health attitudes. Further research is needed to measure the long-range effects of PLP, especially if it is reinforced by regular health education at later grades.

John A. Bonaguro
Ohio University School of HPER
Athens, OH 45701

April 24, 1982
1:15 - 2:45 p.m.

ANALYSIS OF FITNESS INTEREST AND HEALTH PRACTICES WITHIN A CORPORATE ENVIRONMENT.

William B. Baun, Mark A. Landgreen, Eleonor E. Hellman, Tenneco Inc., Health & Fitness Department, Houston, TX; Peter J. Brown, Ventura, CA.

Health and fitness programs in the corporate environment have recently experienced rapid growth; however, there have been few studies describing the fitness interests and health practices within this environment. This analysis represents the initial phase of a longitudinal study designed to test population consistency within a corporate health and fitness program. This investigation describes the specific population, within a large corporation, which showed positive interest towards development of a health and fitness program. Three thousand two hundred and fifty individuals were sent an interest survey; of these 2,316 returned the instrument for a 71% return. A greater percentage of females (84%) indicated a positive response to participating than males (76%). Of the positive responses from females, 29% were under the age of 29, whereas this age group in the male population represented only 16.8% of the positive responses. For both sexes the positive responses decreased with age. The preference for eight listed physical activities were as follows: nautilus (75%), jogging (55%), exercise class (52%), racquetball (47%), aerobic dance (42%), bicycle (38%), walking (31%), and other (5%). From the 2,316 returned interest surveys, a random group of 200 individuals were sent a health practices questionnaire with a return rate of 90%. The results from this questionnaire were grouped by sex, age, employment category (Management/Supervision, Professional/Administrator, Clerical/Seretarial, Other), and a combination of these variables. Chi-square analysis revealed several significant findings in relation to exercise frequency, tension level, back problems, and nutrition. Analysis indicated that males, professional/administrators, and individuals experiencing frequent back pain reported the highest tension levels ($p < .02$). Significant relationships were also determined between exercise frequency and several nutritional habits. Females reported greater frequency in physical examinations than males, and professional/administrators reported less physical examinations than any other job category. These findings suggest that corporate health and fitness programs should be designed to meet the needs and interests of the specific population being served. Future phases of this study should determine the effectiveness of survey analysis as a tool in planning and implementing a health and fitness program with adherence as a major goal.

William B. Baun
Tenneco Inc., Health & Fitness Dept.
P.O. Box 2511, Suite 1014
Houston, Texas 77001

April 24, 1982
1:15 - 2:45 p.m.

INSTRUCTIONAL STRATEGIES: INFLUENCE ON TEACHER BEHAVIOR AND STUDENT MOTOR ENGAGEMENT RATES IN UNIVERSITY FENCING CLASSES.

E.K. Clark, T.L. McKenzie, & R.E. McKenzie, San Diego State University

Although alternative strategies for teaching physical education have been promoted regularly, few empirical investigations have examined the effects that various strategies have on both teacher and student behavior. The purpose of this study was to examine teacher and learner behavior during classes in which motor skills were taught using six different instructional strategies. Data were collected in two sections of beginning fencing classes. The Academic Learning Time-Physical Education-Teacher Behavior observation system, developed by Siedentop et al., was used to code how students spent their time in class and to concurrently code teacher behavior into 16 different categories. Three students were selected randomly from each section. All 56 classes were taught by the same experienced instructor who was naive to the exact behaviors under study. ALT-PE-Motor (amount of time students spend in motor tasks at an appropriate level of difficulty) was coded during 52.9% of the 8,843 intervals observed. ALT-PE-M rates during active learning periods for different teaching strategies were: Machine-paced drilling, 97.9%; sparring, 97.9%; teacher-paced drilling, 94.8%; student-paced drilling, 90.7%; teaching by task cards, 65.9%; and bouting, 26.9%. Teacher behavior was consistent across the two sections,with the most frequently coded behaviors being: Giving feedback, 30.1%; lecturing 18.6%; giving directions, 14.7%; monitoring, 9.7%; modeling, 8.8%; answering questions, 5.1%; providing maintenance, 4.1%; and evaluating, 3.7%. Other behaviors were coded less than 2% of the time each. Variations in teacher behavior occurred during different instructional strategies. For example, during active learning periods rates of teacher feedback were: Machine-paced drilling, 51.6%; student-paced drilling, 54.8%; teaching by task cards, 51.3%; bouting, 31.1%; teacher-paced drilling, 25.4%; and sparring, 18.7%. Results reflect the importance of examining strategies for the opportunity of students to learn motor skills. For example, during task card teaching students were engaged in appropriate motor tasks only 65.8% of the time compared to over 90% for several other instructional styles. In addition, students received feedback from the teacher during 51% of the intervals for machine-paced and student-paced drilling compared to only 25.4% for teacher-paced drilling. Strategies which free teachers from directing and allow them to perform other tasks such as giving feedback while at the same time maintaining high student engagement rates were supported.

Elizabeth K. Clark
Department of Physical Education
San Diego State University
San Diego, CA 92182-0171

April 24, 1982
1:15 - 2:45 p.m.

TEACHER BACKGROUND, TRAINING, AND TEACHER COMPETENCE. Bernard Oliver, University of Texas at Austin

The purpose of this study was to investigate the relationship of teacher training and background characteristics to three commonly used indicators of teacher competence; subject matter knowledge, attitude towards teaching, and skill in the subject matter taught. The impetus for this type of research stemmed from the recent expose of literature doubting the competence and performance of public school teachers (Lyons, 1979; Phi Delta Kappan, 1980; Time, 1980; Newsweek, 1981). The rationale for this line of research is well grounded in research on teaching, with a demonstrable relationship often shown between teaching performance/competence and background and training factors. Moreover, some research suggests that teacher knowledge, attitude, and motor skill are indirectly related to student measures in these same areas (Harnishfeger & Wiley, 1978; Centra & Potter, 1980). Thirty secondary physical education teachers instructing a coed unit on volleyball participated in this study. The choice of content area and topic provided a relatively high level of uniformity of instructional goals, teaching method, and facilitated reliable measurement of teacher knowledge, skill, and attitude. Teachers were administered:a questionnaire to assess training and background factors, a 20-item knowledge test to determine knowledge about volleyball, an attitude measure to determine attitudes about teaching, and two motor skill tests indicative of volleyball playing ability. Reliability coeffecients for the measures employed were relatively moderate (.70). Teacher training factors and background variables were entered into a multiple regression formula to determine the significance of these variables on teacher knowledge, attitude, and motor skill ability. Overall, the regression analysis illustrated that teacher background and training variables accounted for a significant proportion of the variance in the teaching measures employed. The findings of this study suggest that teacher training and background factors are significant variables in teacher competence measures. Moreover, the results imply that altering teacher training experiences and selecting teachers for the teaching profession with specific background experiences might be an effective way to improve student achievement, attitude, and motor skill in an indirect fashion.

Bernard Oliver
Bellmont Hall 222
University of Texas at Austin
Austin, Texas 78712

April 24, 1982
1:15 - 2:45 p.m.

EFFECTS OF THREE INSTRUCTIONAL PACKAGES ON TEACHER BEHAVIOR AND ACADEMIC LEARNING TIME OF SELECTED STUDENTS IN UNIVERSITY PHYSICAL EDUCATION.

David J. Wurzer, California State University, Long Beach

The purpose of this study was to examine the effects of three instructional packages on teacher behavior and to determine if there was a subsequent change in student Academic Learning Time-Physical Education (ALT-PE). ALT-PE is the amount of time a student spends in directly relevant physical education learning tasks which insure a high success rate. Three university physical education professors of volleyball received three instructional packages designed to change management time, feedback, and student non-engagement (the amount of time that students were waiting, off-task, or in an interim phase of instruction or practice) teaching behaviors. Self-directed feedback was delivered before each lesson. The Academic Learning Time-Physical Education-Teacher Behavior Observation System was used by three trained observers. The behavior of the teacher and three randomly selected students in each class for the fifteen-week semester were recorded. An interval recording format was utilized which consisted of six seconds to observe and six seconds to record the codes for the multi-category observation system. Data were reported as a percentage of intervals for each of the three dependent variables: Management time, feedback, and student non-engagement. Two additional variables, not directly intervened upon, were analyzed by means of a concurrent baseline: ALT-PE and ALT-PE (Motor). A multiple baseline design across three behaviors for each subject and across one behavior of all three subjects demonstrated a functional relationship between the intervention and the dependent variables. The intervention was successful in changing target behaviors for all students. Decreases in teacher management time and the time spent not engaged in volleyball, as well as increases in feedback to students, were associated with a significant increase in student ALT and ALT-PE (Motor). The study demonstrated that these instructional packages were a successful and cost effective method of changing teacher behaviors which in turn resulted in student behavior changes.

David J. Wurzer, Ph.D.
Department of Physical Education
California State University
Long Beach, California 90840

April 24, 1982
1:15 - 2:45 p.m.

THE EFFECT OF INTERVAL TRAINING ON ENDURANCE CAPACITY. Thomas P. Martin and Roger P. Farrar, The University of Texas at Austin

Interval training is incorporated into most training regimes for competitive distance runners, yet is rarely used in animal models for aerobic conditioning. A recent study found not only an increase in aerobic capacity in skeletal muscle, but hypertrophy of the left ventricle. We initiated this training study to compare endurance and interval training as a stimulus for increased aerobic capacity and cardiac hypertrophy. Male Sprague Dawley rats endurance-trained for 10 weeks for up to 1 hour/day 5 days/week at 31 m/min. The interval-trained animals trained for 10 weeks also, but interspersed up to 20 (30 second) intervals at 54 m/min with 60 sec. runs at 16 m/min. Both trained groups had approximately a 25% increase in mitochondrial yield per gram of tissue of the gastrocnemius-plantaris, as well as a 40% increase in SDH activity. Contrary to previous reports, interval training did not induce hypertrophy of the left ventricle. The left ventricular weights were 1.01 g for sedentary and .98 g for both of the trained groups. While the left ventricle to body weight ratio was higher in both trained groups, it is concluded that the interval training employed does not produce a sufficient pressure or volume overload to induce cardiac hypertrophy.

Thomas P. Martin
Dept. Physical and Health Education
University of Texas at Austin
Austin, Texas 78712

April 24, 1982
3:00 - 4:30 p.m.

CHANGES IN PLASMA CATECHOLAMINES DURING PROLONGED WORK AND PASSIVE HEATING. Scott K. Powers, Edward T. Howley and Ronald Cox, University of Tennessee and Louisiana State University

The relationship between heat stress and plasma catecholamine concentrations in 5 trained men was studied under two thermal conditions during 45 minutes of bicycle exercise ($\sim 60\%$ $\dot{V}O_2$ max) and during passive heating. On one testing day the subject was heat stressed during exercise by wearing a nylon shell, while on the second day fans were directed on the subject while exercising in a thermoneutral environment (fan treatment). The passive heating experiment was conducted in a hot water bath ($41^{\circ}C$). The exercise heat stress treatment produced a higher plasma norepinephrine (NE) concentration ($P < 0.05$) in all subjects when compared to the fan treatment. The plasma epinephrine (E) concentration was not significantly different ($P > 0.05$) during exercise in the heat stress treatment when compared to the fan treatment. A rise in rectal temperature (T_{re}) during passive heating resulted in quantitatively small changes in plasma E and NE. The heat load, combined with the exercise task, produced an increase in plasma NE concentration greater than the sum of the values measured during exercise in the thermoneutral environment and passive heating, which suggests that the combination of stressors causes an augmentation of the sympathetic nervous system's response. Thus, the added heat load caused changes in plasma NE, with little change occurring in plasma E, suggesting a differential Ca response.

Scott K. Powers
School of HPERD
Louisiana State University
Baton Rouge, Louisiana 70803

April 24, 1982
3:00 - 4:30 p.m.

EFFECTS OF SACCHARIN INGESTION ON EXHAUSTIVE EXERCISE.

R.G. McMurray, University of North Carolina; J.R. Wil
University of North Carolina; B. Kitchell, Duke Univ

Previous research has shown that saccharin inhibits liver glucose-6-phosphate activity (a key step in glycolysis), but it is not known if the inhibition is sufficient to significantly effect exercise performance. Therefore, six trained females ran on three separate occasions at 80% V_{O_2}max until exhaustion. 45 minutes before the runs the subject ingested either 0.5 gm calcium saccharin in 300 ml water, 100 gm fructose in 300 ml water, or 300 ml water (control), the order randomly presented. A double-blind protocol was used. Heart rate, oxygen uptake, and R value were measured at 5-minute intervals and the last minute of exercise. Blood samples were obtained at minutes 0, 15, 30, 45, and at the termination of exercise and were analyzed for glucose, free fatty acids, and lactate concentrations. Heart rate responses were similar for all trials; $\overline{x}$ = 173±8 beats/min. Exercise terminated 52.2±5.5 minutes during the saccharin trials, significantly less (p 0.05) than either the fructose (61.9±8.3 min) or control (65.6±7.6 min) trials. Saccharin ingestion significantly increased oxygen uptake when compared to either the control or fructose treatments (56.0±1.6 ml/kg/min vs 49.6±1.6 & 48.6±1.4 ml/kg/min, respectively). R values during saccharin trials averaged 0.81±0.03, similar to the controls (R = 0.85 ±0.03) but significantly less than the fructose trials (R = 0.93 ±0.02). The subjects utilized 1005±49 Kcals during the control trials, significantly greater than either the saccharin (945±28 Kcal) or fructose (964±69 Kcal) treatments. The saccharin treatment resulted in a significantly higher ratio of carbohydrate to fats utilization (1.15) than either the controls (1.95) or fructose (6.57) trials. Blood lactates were similar for all treatments. Blood glucose was significantly higher after saccharin ingestion that either the fructose or control treatments. Plasma free fatty acids were similar for saccharin and fructose trials, but significantly less than the control trials. These results suggest that the ingestion of saccharin solutions prior to exercise attenuates endurance performance. Therefore, it is suggested that athletes refrain from saccharin solutions for six to eight hours prior to performance.

Robert G. McMurray
Dept. of Physical Education
University of North Carolina
Chapel Hill, North Carolina 27514

April 24, 1982
3:00 - 4:30 p.m.

KINETICS OF PLASMA LACTATE ACCUMULATION IN TRAINED MEN DURING GRADED EXERCISE. Steve Dodd, Scott Powers, Penelope England and Richard Tulley, Exercise Science Laboratory, Louisiana State University and E. K. Long Hospital, Baton Rouge, La.

Nine trained men were studied during graded cycle ergometer exercise in order to examine the kinetics of plasma lactic acid accumulation. Subjects began exercising at a work load of 30 watts while the load was increased by 30 watts every three minutes until the subjects could not maintain the prescribed pedal frequency. Blood samples were obtained via an indwelling venous catheter at each work load and assayed for lactic acid by an enzymatic technique. Expression of plasma lactic acid as a function of the relative work load (%$\dot{V}O_2$ max) was examined with linear and quadratic models. Three segments of the curve (20-40, 40-60, _ 60% VO_2 max) were fit with both linear and quadratic models, with the quadratic equations accounting for more total variance. The entire curve was best fit with the quadratic model $y = B - B_1X_1 + B_2X_1^2$. Thus, no single or combination of simple linear models can describe the curve as well as the second order model with one variable. Further, we do not view the measurement of plasma lactic acid as a direct indication of the rate of lactate production in the muscle, but rather as an indirect "marker" relating to the change from aerobic to anaerobic metabolism.

Steve Dodd
School of HPERD
Louisiana State University
Baton Rouge, Louisiana 70803

April 24, 1982
3:00 - 4:30 p.m.

MOTIVATION DURING MAX $\dot{V}O_2$ TESTING OF INTERCOLLEGIATE FEMALE CROSS COUNTRY RUNNERS.

Nancy Kay Butts, Randall Jensen & Mark Lui, LaCrosse Exercise Program, Department of Physical Education, University of Wisconsin - LaCrosse

In order to obtain a true maximal effort it is generally assumed that verbal encouragement should be given a subject during max $\dot{V}O_2$ tests. Twenty members of an intercollegiate cross country team performed 2 max treadmill tests. One test (verbal) was a typical max test with the subject being verbally encouraged to keep going as long as possible. The second test (silent) was performed in a quiet or relatively silent setting with minimal interaction with the subject during the run. The test sequence (verbal/silent or silent/verbal) was randomly assigned. Individuals performed each test at the same time of day with atleast 24 hours, but no more than one week, elasping between sessions. A dependent t-test indicated no significant difference ($p > .05$) in max $\dot{V}O_2$ (58.7 vs 58.8 $ml \cdot kg \cdot min^{-1}$), RER (1.13 vs 1.14) or $\dot{V}_E$ (94.0 vs 95.8 $L \cdot min^{-1}$) between the silent and verbal conditions. The verbal condition, however, resulted in significantly ($p < .05$) higher heart rates (191.5 vs 189.7 bpm) and time of the treadmill run (554 vs 527 sec) than the silent condition. It appears that in highly trained female competitive runners, verbal encouragement may enhance actual running time but not significantly alter the max $\dot{V}O_2$ values.

Nancy Kay Butts
Department of Physical Education
University of Wisconsin - LaCrosse
LaCrosse, Wisconsin

April 24, 1982
3:00 - 4:30 p.m.

PHYSICAL FITNESS STATUS OF A SELECTED POPULATION OF MIDDLE SCHOOL STUDENTS.

Joe V. Chandler and Lorraine A. Redderson, Lander College, Greenwood, S. C.

The purpose of this study was to assess the physical fitness status of all the middle school students in Greenwood, S. C. School District 50. A secondary purpose was to compare the results of each school to test for any significant differences. The South Carolina Phvsical Fitness Test was utilized to test fourteen hundred and sixty-one (1,461) fifth and sixth grade students. Test items included the nine-minute endurance run (cardiovascular endurance), sit-ups in one minute (abdominal strength and endurance), the sit-and-reach (low back and hamstring flexibility), and the skinfold test (body composition). Three schools were included in the study, and two days of testing were necessary at each school. Trained personnel conducted all the testing, and procedures described in the test manual were followed closely. The data were analyzed by computer (SAS Program), and print-outs were prepared which would facilitate the interpretation and distribution of the individual scores at each school. Statistical analysis included T-Test to study the differences between means for each sex and age group. The T-Test results were used to help identify possible differences between schools. The .05 level of confidence was chosen as the level necessary to render a result statistically significant. The statistical results revealed that 69.1% of the students fell below the criterion score on the cardiovascular test, 70.7% on the sit-up test, 26.3% on the flexibility, and 37.3% scored above the criterion level on the skinfold test for body composition. In general, on all except the flexibility test, females fell further below their (female) criterion scores than males fell below their (male) criterion scores. No significant differences were noted between schools. Possible causative factors for these results are numerous, but the one obvious conclusion is that these students were not as physically fit as they should be. Further, these results clearly indicate that development of good physical fitness requires physical activity and will not occur spontaneously in children.

Joe V. Chandler, Ed.D.
Lander College
Greenwood, South Carolina 29646

April 24, 1982
3:00 - 4:30 p.m.

RELATIONSHIP BETWEEN POSTURAL DEVIATIONS AND PERCENT BODY FAT OF OBESE BOYS.

Thomas L. McKenzie and Peggy Lasko, San Diego State University

Although major diseases related to obesity, such as hypertension, diabetes, and heart disease, have been studied in some detail, there is little quantitative information regarding other aspects of morbidity important to overweight individuals. Little is known about the effects of carrying excess weight on the development of posture. The purpose of this study was to examine the relationship between obesity and postural deviations in boys. Subjects were 52 boys, ages 9-17, from predominately white, upper-class families in Southwestern United States. Body fat mass of the subjects ranged from 22.0 to 43.4% with a mean of 32.8%. Percent body fat was estimated from skinfold measures taken at four sites (biceps, triceps, suprailiac, and subscapular) with a Lange caliper. Permanent records of the posture of subjects were made by photographing them from anterior, posterior, and lateral views as they stood behind a posture screen. Subjects wore swim trunks to allow for observations of landmarks critical for determining deviations. The photographs were examined systematically to determine the occurrence and severity of 10 possible deviations. An eleventh deviation, pes planus, was determined by using the Feiss line method. Subjects averaged 4.87 postural deviations each. Percent occurrence for deviations with all subjects was: forward head, 61.5%; kyphosis, 34.6%; forward shoulders, 19.2%; lordosis (< 5 cm.), 32.7%; ptosis, 98.1%; winged scapula, 40.4%; genu valgum, 82.7%; genu varum, 1.9%; genu recurvatum, 23.1%; pronated ankles, 44.2%; and pes planus, 48.1%. Compared to non-obese boys of the same age, incidence of deviations in weight-bearing regions was extremely high (e.g., genu valgum, 82.7% cf. 8%). Significant ($p < .05$) correlations between subjects' percent body fat and incidence of deviations in weight-bearing regions (genu valgum, pronated ankles, and pes planus) were evidenced. When categorized into 3 age groups, there was a stepwise increase in frequency of forward shoulders, genu recurvatum, and pronated ankles with older groups. The data indicate concomitant posture problems associated with obesity in maturing boys and point out the necessity for remediation of both obesity and posture problems before they become firmly established.

Thomas L. McKenzie
Physical Education Department WG 407
San Diego State University
San Diego, CA 92182

April 24, 1982
3:00 - 4:30 p.m.

BIOVIDEOGRAPHY - A NEW TECHNIQUE FOR TEACHING AND RESEARCH IN PHYSICAL EDUCATION AND SPORTS SCIENCE.

D.A. Brodie, University of Liverpool, England

The purpose of this work was to establish a method of improving teaching and research by making active student participation in recorded experiments a practical possibility. The principle of biovideography is to encode biological signals on the spare audio track of a Umatic videotape recorder. This means that a number of biological signals can be obtained simultaneously, and any two of these can be selected and recorded onto the videotape. The normal function of the videotape recorder is unaltered and therefore the vision, sound and biological information are recorded in perfect synchrony. In the replay mode, the vision and sound are presented on the television monitor as normal, and the biological information is demodulated and restored simultaneously to its original analog format. The form of the analog display is optional but is usually presented to the student or researcher on an oscillograph, providing a hard ccpy of the original biological information. It is possible to 'slave' up to 100 oscillographs from one biovideograph so that a large number of students can participate in a single experiment. The research applications are numerous and include the analysis of combined visual and analog data, the ability to repeat specific parts of an experiment, and the opportunity to examine analog data in more detail by increasing the oscillograph chart speed. Research involving specific personnel, such as international athletes, can be completed once and replayed as often as required, thus being economical on the athlete's time. The system is particularly useful for research on live animals when mortality and expense become considerations. Biovideography has been applied in teaching and research to the disciplines of pharmacology, physiology, veterinary and sport science. It may be concluded from student reaction that participation in an experiment by this method enhances learning.

Dr. David A. Brodie
Department of Physical Education
University of Liverpool, England

April 24, 1982
3:00 - 4:30 p.m.

MOTOR OUTPUT VARIABILITY DISTINCTIONS BETWEEN NORMAL AND LEARNING DISABLED CHILDREN. Denis Brunt, University of Texas, Austin; Richard Magill, Louisiana State University; Robert Eason, University of New Orleans

Motor output variability should be expected to differentiate normal children from learning disabled children who indicate perceptual-motor difficulties since motor output variability has been suggested to be a function of motor program selection and implementation (Schmidt et al. 1979). In this experiment, motor output variability was investigated by having children learn an alternating tapping task to a criterion of a specified number of taps per minute and then having them transfer to more difficult tapping tasks requiring the same rhythmic beat but requiring more distance to move or more accuracy, thus requiring some modification in the existing motor program involved in the training task. Subjects were normal (n=15) and learning disabled (n=15) children in each of two age groups, 8 and 10 yrs. old. Three tapping boards were used, each having a different Fitts Index of Difficulty (ID). The two transfer boards increased either distance traveled or accuracy requirements compared to the training tapping board. Subjects were required to perform the training task at a rate of 30 bpm, as controlled by a metronome, for 20 sec. They continued this task until they achieved 3 consecutive correct trials or had performed 20 trials. Subjects then performed the two transfer tasks to the same performance criterion. Results revealed significant main effects for group, age, and task, while no interactions were significant. Normal children performed better on all three tasks than learning disabled while 10-yr.-olds performed better than 8-yr.-olds. These results suggest that motor output variability is a distinguishing feature between normal and learning disabled who show evidence of perceptual-motor difficulties. These results are discussed in terms of implications for understanding why these differences occur.

Dr. Denis Brunt
Dept. of HPER, Univ. of Texas
Austin, Texas 78712

April 24, 1982
3:00 - 4:30 p.m.

ANALYSIS OF ANAEROBIC WORK CAPACITY DURING TESTS OF VARYING DURATION.

Edmund J. Burke, Springfield College; Irene Wojcieszak, M. Puchow, Institute of Sport, Warsaw, Poland; Ernest D. Michael, University of California, Santa Barbara

The purpose of this study was to analyze anaerobic work capacity as assessed by all-out bicycle tests of varying duration. This analysis was based upon: (1) the change in power output relative to time and (2) the energy sources utilized. Data were collected in 10 male physical education students, aged 18-22 years. Each S took part in 4 tests on a Monark bicycle ergometer at a constant setting of 5 kp for time durations of 15s, 30s, 60s and 120s. With the exception of the 120s test, the S was told to pedal as fast as possible for the entire test. Based upon pilot work, 90 rev/min was used for the 120s test. The rate of pedaling was recorded using a photocell and a chart recorder with a 50 m/s rate of tape shift. This permitted a calculation of the duration of each revolution, the total number of revolutions and the instantaneous power output during a single revolution. The time of attainment of maximal power and the total mechanical work done were measured for each test. $\dot{V}O_2$ during and following exercise was measured using a Jaeger Ergoneumostat, thus permitting a calculation of mechanical efficiency based upon net energy expenditure. Total mechanical work done for tests of increasing duration was 9.65, 16.94, 27.41 and 42.94 kJ, respectively. The mean power output was decreased with increasing test duration as follows: 640.2, 557.4, 454.8 and 357.6W, respectively. Maximum power was attained fastest in the 15s test, but sustained longest in the 30s and 60s tests. Maximum instantaneous power in the 3 tests using all-out rev/min was 613-817W, 579-736W and 529-717W, respectively. The energy cost of the tests was 28.4 kcal (118.3 kJ), 32.2 kcal (134.1 kJ), 52.4 kcal (218.3 kJ) and 65.3 kcal (272.1 kJ), respectively. The anaerobic yields were 94.4, 87.2, 74.6 and 55.4 percent, respectively. Total O_2 debt was significantly greater ($p<.01$) in tests lasting 60 and 120s as compared with the shorter tests. With prolonged test duration, there were greater blood lactate levels, thus indicating greater glycolytic involvement. The data reflect the well-established principle of specificity of metabolic energy sources based upon duration of all-out effort. There is not one "best" test of anaerobic work capacity.

Edmund J. Burke
Department of HPER
Springfield College
Springfield, MA 01109

April 25, 1982
8:45 a.m.

RELATIONSHIP BETWEEN INTENSITY OF TRAINING AND MENSTRUAL IRREGULARITIES IN PREVIOUSLY SEDENTARY COLLEGE WOMEN.

Arthur Weltman, Joanne Henritze, Rob Schurrer, Charlotte Feicht Sanborn, University of Colorado, Boulder

In order to examine the effects of intensity of training on the menstrual cycle, 33 previously sedentary college-aged women participated in a twelve-week training program. Subjects were randomly assigned to 3 groups: training above the onset of blood lactate accumulation (↑OBLA) (N=12), training below OBLA (↓OBLA) (N=11), and control (C) (N=10). Subjects in the two training groups exercised 5 times per week. Individual work loads and times were adjusted to place subjects ↑ or ↓ OBLA and to insure that 350 Kcal were expended per exercise session. Subjects were assessed for $\dot{V}O_2$ max, OBLA, $\dot{V}O_2$ associated with OBLA ($\dot{V}O_2$-OBLA), and body composition parameters (hydrostatic weighing) before and after the training program. Menstrual histories were also obtained before and after the 12-week experimental condition. Subjects' menstrual cycles were classified as either normal, slightly irregular, very irregular or absent, based on a previously validated questionnaire. Results indicated that training, regardless of intensity, was associated with an increase in menstrual irregularities. Forty-two percent of the women in the ↑OBLA group and 36 percent of the women in the ↓OBLA group exhibited menstrual irregularities during the training program ($p < .05$). None of the menstrual histories in the C group changed during the experimental time frame. Results further indicated that the prevalence of menstrual irregularities was not related to changes in $\dot{V}O_2$ max, OBLA, $\dot{V}O_2$-OBLA or percent body fat. It was concluded that a significant number of previously sedentary college age women develop menstrual irregularities when initiating a physical training program.

Arthur Weltman
Dept. of Physical Educ. & Recreation
University of Colorado
Boulder, CO 80309

April 25, 1982
9:00 a.m.

VALIDITY OF GAS EXCHANGE INDICES AS A MEASURE OF ANAEROBIC THRESHOLD ON THE TREADMILL.

L. J. Ponton, S. Tucker, B. Macy and A. A. Sucec, Exercise Physiology Laboratory, San Diego State University, San Diego, California

It was the purpose of this study to determine if gas exchange indices ($\dot{V}_E$, $\dot{V}_{CO_2}$, $\dot{V}_E/\dot{V}_{O2}$ and FEO_2) are a valid measure of anaerobic threshold (AT). An abrupt sustained increase in venous blood lactate (HLa) was considered as the criteria measure. Eighteen experienced runners volunteered to participate ($\bar{x}$ weight = 70.03 ± 9.3 kg; $\bar{x}$ height = 178.76 ± 7.76 cm; $\bar{x}$ % fat = 9.94%). Their mean $\dot{V}O_2$ max for a one-minute incremented test was 55.16 ml/kg·min^{-1}. Subjects performed a continuous incremental work test on an A. R. Young treadmill which commenced at a speed of either 180m/min or 200 m/min, depending on the training history of each subject, and was increased 10m/min each 3-minute period. Two ml blood samples were drawn from an indwelling catheter in the mid-forearm, 15 secs prior to each increase in workrate. HLa was determined by the Sigma enzymatic technique, using a Bausch and Lomb Spectronic 710. The mean AT for gas exchange values and blood HLa determinations were 2.79L/min and 2.75L $\dot{V}O_2$/min, respectively with a validity coefficient (r) of 0.97 (SEE = ± 0.11 L$\dot{V}O_2$). It was concluded that gas exchange indices are a valid measure of AT on the treadmill.

L. J. Ponton and A. A. Sucec
Exercise Physiology Laboratory
San Diego State University
San Diego, CA 92182

April 25, 1982
9:15 a.m.

THE EFFECT OF INCREMENT DURATION ON ANAEROBIC THRESHOLD WHILE TREADMILL RUNNING.

A. A. Sucec, L. J. Ponton, B. Macy and S. Tucker, Exercise Physiology Laboratory, San Diego State University, San Diego, CA

The purpose was to determine if one- or three-minute increments resulted in different mean VO_2 scores for anaerobic threshold (AT) using the venous blood lactate accumulation point as the criteria for AT. Eighteen experienced runners served as subjects; their anthropometric characteristics are as follows: $\bar{x}$ weight = 70.03 ± 9.3 kg; $\bar{x}$ height = 178.76 ± 7.76 cm; $\bar{x}$ % body fat = 9.94%. Their mean VO_2 max was 55.2 ml·kg^{-1}·min^{-1} for a continuous one-minute, incremented treadmill run to exhaustion. Two ml blood samples were drawn from an indwelling catheter in the mid-forearm 15 secs prior to the end of each increment. The lactate values were determined by a Sigma enzymatic technique using a Bausch and Lomb Spectronic 710. The subjects were randomly assigned to one- and three-minute continuous treadmill protocols. The initial speed was either 180m·min^{-1} or 200m·min^{-1} based upon running ability and recent training habits. The treadmill was horizontal as the speed was increased 10m·min^{-1} up to 330m·min^{-1}. Once 330m·min^{-1} was attained by a subject, the speed was held constant and the grade was increased by 1.5% for each increment to exhaustion. The AT VO_2 for the one-minute protocol was 2.77 L·min^{-1}, while the AT VO_2 for the three-minute protocol was 2.79 L·min^{-1}. These data suggest that VO_2 for AT is unaffected for treadmill protocols employing increments from one to three minutes in duration.

A. A. Sucec
Exercise Physiology Lab
San Diego State University
San Diego, CA 92182

April 25, 1982
9:30 a.m.

EFFECTS OF EIGHT WEEKS OF INTERVAL TRAINING ON ANAEROBIC METABOLISM INDICATORS OF FEMALES.

Patricia F. McGuigan, East Carolina University; Bruce J. Noble, University of Wyoming

This study investigated the effects of interval training on anaerobic metabolism indicators and determined which type of interval training--long-distance sprints or short-distance sprints--had the greatest effect on specific indicators. Anaerobic metabolism indicators studied were: (1) anaerobic power, (2) anaerobic threshold (AT), (3) maximum lactate and (4) total LDH activity following maximal exercise. Twenty female students (aged 19-25) performed a series of tests before and after an eight-week training period to determine anaerobic parameters. A short-distance (E_{sd}) group (N=6) trained at sprints of 50-200 yards. A long-distance (E_{ld}) group (N=7) trained at sprints of 250-400 yards. A control (C) group (N=7) remained inactive between pre- and post-tests. Anaerobic power was determined by using the stair running test outlined by Margaria and the vertical jump. Each subject performed a graded treadmill walk-run test outlined by Davis. AT was determined by plotting ventilation (BTPS) against oxygen consumption (VO_2 L/min). AT was identified by percent of VO_2-max and was the point of departure from linearity in VE responses. Maximal blood lactate and total LDH activity were determined by Calbiochem (Doc. #L03053) and Calbiochem (Doc. #L03138) methods, respectively. A dependent t-test indicated that only E_{sd} improved significantly ($p<.05$) in anaerobic power. None of the groups demonstrated a significant change ($p>.05$) in AT or total LDH activity. E_{ld} improved significantly ($p<.05$) in maximum blood lactate. A two-way ANCOVA and Scheffés post hoc analysis indicated that E showed greater anaerobic power ($p<.05$) while E_{sd} showed greater maximum lactate values ($p<.05$). No significant differences ($p>.05$) were indicated in AT or total LDH activity. In conclusion, interval training showed no effect on AT or total LDH activity. E_{sd} improved anaerobic power, while E_{ld} demonstrated a high maximal blood lactate value following training.

Patricia F. McGuigan
Department of Physical Education
East Carolina University
Greenville, NC 27834

April 25, 1982
9:45 a.m.

CHANGES IN KNOWLEDGE, FITNESS, AND ATTITUDE AS A RESULT OF A COLLEGE HEALTH FITNESS COURSE. Paul Brynteson, Jim Hoag, Sally Schollmeier, Oral Roberts University

With the current national interest in promoting the health and fitness of individuals, the purpose of this study was to determine if knowledge, fitness, and attitude could be improved as a result of a one-semester college health fitness course. Additionally, if these parameters could be improved, which of four methods of instruction would result in the greatest improvements. One hundred and forty-seven college students enrolled in 4 Health Fitness classes at Oral Roberts University were tested before and after 15 weeks of instruction. Knowledge was measured by a 100-question multiple choice test, attitude was measured by the MacPherson-Yahoaz Attitude toward Exercise and Physical Activity test, and fitness was measured by a 1.5 mile run for males and 1.25 mile run for females. The health fitness classes met once per week for 2 hours. All 4 classes used the same test and followed the same course requirements and laboratory procedures. Class 1 was given a 1-hour lecture each week followed by a 1-hour laboratory experience. Class 2 viewed a television taped lecture in class followed by the same 1-hour laboratory session. Class 3 viewed the television taped lecture on their own time outside of class, and the class time was devoted to discussion followed by the same 1-hour laboratory. Class 4 received neither the live or taped lecture but was given a study guide to accompany the text, and class time was devoted to discussion followed by the same 1-hour laboratory experience. Statistics revealed that all four groups significantly improved at the .01 level of confidence in knowledge, fitness, and attitude, and that there were no significant differences among the four groups. It was concluded that knowledge, fitness, and attitude can be improved in college students as a result of a well-organized health fitness course to the same degree regardless of the specific methodology employed.

Dr. Paul Brynteson
Professor of HPER
Oral Roberts University
Tulsa, Oklahoma 74171

April 25, 1982
10:15 a.m.

HEALTH EDUCATION INTERESTS OF SENIOR HIGH SCHOOL STUDENTS IN THE GREENSBORO PUBLIC SCHOOLS.

Beverly E. Blue, M.Ed., R.H.Ed., Greensboro Public Schools; James A. Fitch, Ph.D., R.H.Ed., UNC-G

This study was designed to determine the health content areas of greater and lesser interest to students in grades ten, eleven, and twelve, and to discover any differences in those interests by grade level, sex, and race. The health content areas investigated were: Family Health; Control and Prevention of Disease; Drugs and Narcotics; Safety Education; Mental Health; Personal Grooming; Weight Control; Nutrition; Structure and Function of the Human Body; Community Health; Consumer Health; Alcohol; Smoking; Dental Health; and Death and Dying. An anonymous, written survey containing health statements was used to measure the depth of interest expressed in the health content area. Students were asked to indicate their interest in knowing more or learning more about each health statement; choices were: high interest, medium interest, low interest, and no interest. Demographic items concerning grade level, sex, and race were also included. The survey was administered during March, 1981 to randomly selected students enrolled in grades ten, eleven, and twelve in the Greensboro Public Schools, Greensboro, North Carolina. Two hundred sixty-eight students participated in the study, generating two hundred sixty-six useable answer sheets. The data collected were computer analyzed using the Statistical Analysis System Users Guide. Analyses showed that for the entire study population the health content areas of greater interest were: Mental Health; Family Health; Safety Education; Death and Dying; Alcohol; and Weight Control. Students in grades eleven and twelve expressed greater interest in more than twice as many areas than did students in grade ten. Female students were interested in dramatically more health content areas than were male students; the depth of interest expressed by female students was substantially more than that expressed by male students. Black students expressed greater interest in more than three times as many areas than did white students; black students also indicated a greater depth of interest in several areas than was indicated by white students.

Beverly E. Blue, M.Ed., R.H.Ed.
Greensboro Public Schools
Drawer V, Greensboro, NC 27402

April 25, 1982
10:30 a.m.

AN EPIDEMIOLOGICAL ANALYSIS OF UTAH MOTORCYCLE ACCIDENTS, 1975-1980. Bryan C. Smith, University of Utah

This study reports some epidemiologic features of motorcycle collision injuries and fatalities that occurred in Utah from 1975 to 1980. Data involving 6,081 motorcycle injury crashes were collected, coded, and analyzed. An accident report form that described the driver, injury, vehicle, and environment was completed by the investigating officer. In addition, an indicator of personal driving behavior was collected on crash victims by compiling a driver history record. The incidence of both motorcycle accidents and fatalities has increased in recent years. The accidents are more likely to be serious or fatal due to the lack of protective riding gear, mainly helmets (88.6% of the fatalities in 1980 were not wearing helmets). Utah motorcyclists are at fault 85% of the time and their safety behavior seems less than desirable. The highest age and sex specific incidence rate is in males of the 16-20 age group. However, the median age has gradually shifted from 18.2 in 1975 to 26.4 in 1980. Crash victims have little vehicular driving experience and even less motorcycle driving experience. The majority had less than one year experience on the motorcycle involved in the crash. Risk of injury was not related to make of motorcycle, but was related to engine size, with the highest accident frequency in the 400 to 800 cc size. Risk of injury was associated with drivers of short stature operating intermediate or large size motorcycles. Motorcycle accidents occurred most frequently during the afternoon and evening hours (4-7 p.m.) during the months of June, July, and August when motorcycle use is at its highest. Age of driver, use of helmets, type of collision, culpability and degree of conspicuity were shown to be related to the severity of the injury involved.

Bryan C. Smith, Ed.D.
College of Health HPER N-209
University of Utah
Salt Lake City, UT 84112

April 25, 1982
10:45 a.m.

SPECIFIC COMPETENCIES BY SETTINGS FOR BACHELOR LEVEL COMMUNITY HEALTH EDUCATORS.

Mary S. Sutherland, Florida State University

This study was designed to determine and analyze the needed knowledges/competencies/skills of bachelor level community health educators by settings of practice, i.e., community or public health agency, medical care setting, and schools. An instrument was designed and validated to determine the importance of specific competencies (N=99) in the areas of administration (N=19), communication (N=30), general health knowledge (N=38), and evaluation (N=13). Respondents rated each competency as follows: "1" little or no importance; "2" some importance: "3" average importance; "4" above average importance; and "5" great importance. The 67 respondents indicated higher ranking competencies as: 1, Educational Strategies; 2, Identification of Health Education Resources; 3, Projecting Enthusiasm for Health Education; 4, Health Care System; 5, Program Evaluation; 6, Small Group Process Techniques; 7, Program Planning/Development; 8, Interacting With Own Staff; 9, Developing Rapport With Community Leaders; and 10, Adult Learning. Analysis of the data by settings found that the competencies varied by practice settings, indicating a need to individualize students' professional preparation programs. In addition, major differences were found in rank of competencies between higher education health educatiors and "grass roots" health educators. Following are higher ranking competencies per setting: Community/Public Health--Projecting Enthusiasm for Health/Education, Educational Strategies, Small Group Process Techniques, Program Evaluation, Mental/Emotional Health, Working With Consumer Groups, Health Care System; Medical Care System--Identification of Health Education Resources, Small Group Process Techniques, Projecting Enthusiasm for Health Education, Making Presentation, Educational Strategies, Adult Learning, Program Planning/Development, Health Care System, Health Behavioral Inventories; Schools--Identification of Health Education Resources, Program Planning/Development, Sociology, Interacting With Own Staff, Educational Strategies, Health Care System, Conducting Health Programs for Schools, Public Relations, Tobacco. Discussed further in the presentation will be additional rankings of competencies by settings and implications.

Mary S. Sutherland
Dept. of Human Services/Studies
Florida State University
Tallahassee, Florida 32306

April 25, 1982
11:00 a.m.

105

CHARACTERISTICS OF SELECTED TENNIS SKILL TESTS. Larry D. Hensley, University of Northern Iowa, Cedar Falls

The purpose of this study was to investigate gender differences in performance on selected tennis skill tests and to identify underlying components of tennis playing ability. With the advent of Title IX legislation, the identification of unbiased sport skill tests and the establishment of motor performance standards have assumed notable significance. Fourteen tennis skill tests, purporting to measure the fundamental skills required of a beginning level tennis player, were administered to 36 males and 44 females enrolled in a beginning tennis class at the collegiate level. The findings revealed significant sex differences in performance, with the males, on the average, scoring significantly better than females on each of the 14 skill tests. The data were then analyzed by the following factor-analytic techniques for each sex group and for the combined sample: (A) alpha factor analysis, (B) canonical factor analysis, and (C) maximum-likelihood factor analysis. Both oblique and orthogonal rotations were performed with each of the three analyses. The factor analyses of the 14 skill tests revealed a similar factor structure for both sex groups. That is, the following three components were robust across models: (A) the ability to strike the ball overhead from a self-toss (serve), (B) the ability to strike an approaching ball after it had bounced (ground stroke), and (C) the ability to strike an approaching ball before it had bounced (volley). Interestingly, separate forehand and backhand components did not develop as distinct factors. Since similar factor structures were identified for both males and females, it may be concluded that the tests selected in this study were measuring the same skill components and, consequently, were not sex biased. However, since gender differences in mean performance were detected, it is suggested that separate performance standards would be appropriate.

Larry D. Hensley
School of HPER
University of Northern Iowa
Cedar Falls, Iowa 50614

April 25, 1982
11:30 a.m.

THE APPLICABILITY OF SEQUENTIAL TESTING PROCEDURES TO THE CRITERION-REFERENCED MEASUREMENT OF MOTOR SKILLS.

Judith A. Spray, University of Iowa

Most of the tests currently employed in the criterion-referenced testing of motor performance skills are characterized by a fixed test length. It is possible to fix such a test length, k, in some decision-theoretic framework by the *a priori* consideration of the type I (α) and type II (β) misclassification errors that will be tolerated in the classification of masters and nonmasters of the skill. However, it is also theoretically possible to adapt sequential testing procedures, such as a sequential probability ratio (SPR) test to a criterion-referenced testing situation. A sequential test of this type requires the setting of type I and type II misclassification errors to be tolerated, similar to that of the fixed length test. The major difference between the two testing methods is that the sequential procedure allows each examinee to take the test with a *variable* test length, $k(p)$, while still being classified with the same misclassification probabilities, α and β. Once certain test parameters have been set, the test length, $k(p)$, is only a function of the individual's true domain score or ability level, p. For many individuals (i.e., for many values of p), the variable test length, $k(p)$, will be considerably less than the fixed test length, k. Such a test could result in a considerable savings in classification time for the practitioner. In addition, since the construction of the test requires the consideration of misclassification probabilities, such a test would *force* test users to consider this frequently ignored characteristic of criterion-referenced testing for mastery. This paper presents a step-by-step procedure for the general construction of such a sequential criterion-referenced test. These steps include: the setting of the test parameters; the generation of the testing tables required to administer the test and determine the stopping points of the test; the estimation of the expected number of trials required for classification for the examinees, given their true ability level, p; and the practical considerations for test administration.

Judith A. Spray
Dept. of Physical Ed & Dance
University of Iowa
Iowa City, IA 52242

April 25, 1982
11:45 a.m.

A SEQUENTIAL CRITERION-REFERENCED BADMINTON SHORT SERVE TEST.

Bethany Shifflett, Linda Hooper, Sherry Jackson, Judith A. Spray, University of Iowa

The purpose of this study was to construct and administer a sequential criterion-referenced badminton short serve test. It was hypothesized that testing students sequentially could result in a considerable savings in classification time (i.e., the number of trials required for mastery or nonmastery classification). The criterion-referenced test used was similar to the norm-referenced test by Verducci (1980). Misclassification errors, α and β, were both set a priori at .05. The criterion parameters for mastery and nonmastery (i.e., the cut-off criteria) were set at .7 and .5, respectively. Given these parameters, a testing sheet was constructed that contained the stopping points, or the trial numbers required for classification. The skill test was administered to 20 volunteer graduate and undergraduate students at the University of Iowa. Subjects were given a verbal test description and 20 practice trials before taking the test, and all subjects were tested until classified. The subjects were then retested the following day, using the same skill test and procedures as on day 1. The classification reliability coefficients of the test, as determined by the proportion of agreement and kappa, were .95 and .64, respectively. The average number of trials required on day 1 and day 2 was 16.5 and 15.1, respectively. A fixed length test with identical test parameters would have required 62 trials for each subject for classification. Therefore, the sequential criterion-referenced test averaged 46.2 fewer trials per subject, for a 400% savings in classification time.

Bethany Shifflett
Dept. of Physical Ed & Dance
University of Iowa
Iowa City, IA 52242

April 25, 1982
12:00 noon

DEVELOPMENT OF A VALID MEANS OF EVALUATING FACULTY MERIT. James R. Morrow, Jr., University of Houston

The use of merit evaluation and differential faculty reward structures as opposed to "across the board" pay raises is an issue that has stirred conflict and emotions. Faculty members question the validity of the ratings made by persons or committees which assign "merit ratings" to individual faculty members. The purpose of the present research was to develop a merit evaluation procedure based upon an extension of Scriven's evaluation work and to determine the reliability and potential validity of the procedures when used within a Health, Physical Education and Recreation Department. Initially, professorial rank differential criteria and weighted point values were developed by a five person committee elected by the departmental faculty. Teaching, scholarly activities, and service were to carry equal weighting. College policy dictated that final point values be awarded on a scale of 1-5 within each area of productivity. Once the "point system" was developed for each area of productivity, committee members were to follow specifically designed steps in order that all reviewers accomplish steps in a similar manner. Committee reviewers independently arrived at two values for each person within each performance category: 1) a raw score based upon "points" awarded and 2) a converted score of 1-5 as dictated by the college. Once individual ratings were determined by the review committee, the committee met and reviewed all converted scores assigned for each faculty member. This resulted in modification of the final assigned rating for some faculty members in some performance categories. Subsequent intraclass reliability analysis of the data indicated that raw scores and converted scores were quite reliable (teaching r greater than .86; scholarly activities r greater than .92; service r greater than .84). Further analyses included: 1) determination of the rater(s) who contributed to a reduction in rating variance, thus reducing the reliability of the scores and 2) determination of validity coefficients for the raters based upon the criterion of final rating score assigned within each of the performance categories. Results indicate that the rating system is one which is very reliable and potentially quite valid. Such a system has the additional advantage of informing faculty members of exactly what is being rewarded with the merit system thus permitting them to modify behavior where such is necessary or desirable. This format is suggested as an improvement upon those wherein the rated faculty member is unaware of the system utilized or receives only a global rating of merit.

James R. Morrow, Jr.
Department of HPER
University of Houston
Houston, Texas 77004

April 25, 1982
12:15 a.m.

INFLUENCE OF DECISION-MAKING BY ELEMENTARY CHILDREN ON ATTITUDES, CREATIVITY, MOTOR SKILLS AND SELF-CONCEPT. Paul G.Schempp, Kent State University; John T. F. Cheffers, Boston University

Attitudes, creativity, self-concept and motor skills were measured to determine the influence of decision-making on elementary children. Three groups of children (N=208) were studied; one group received instruction with the teacher dominating all classroom decisions, another group was encouraged to share in the decision-making and a third group served as a control. Data were collected immediately before and after an 8-week instructional program of basic movement and gymnastics. MANCOVA indicated the two treatment groups had significantly higher scores than did the control group, and the group of children allowed to make decisions scored significantly higher than the teacher-dominated group on measures of creativity, motor skills, and self-concept. A 2 X 2 X 5 ANOVA revealed significantly more positive attitude scores for children encouraged to make decisions regarding their learning. Further, Pearson product-moment correlation showed the tested variables to be independent measures of a child's development. It was concluded if a teacher desires to increase positive attitudes toward human movement, enhance creative thinking, improve fundamental motor skills, and develop a healthier self-concept in elementary school children, it appears these objectives are successfully met by encouraging children to make decisions regarding their learning.

Paul G. Schempp
263C Memorial Annex
Kent State University
Kent, OH 44240

April 25, 1982
1:15 p.m.

THE IMPACT OF MOSSTON'S TEACHING STYLES ON THE MOTOR SKILL ACQUISITION OF FIFTH GRADE CHILDREN.

Michael Goldberger, Philip Gerney and Arnold Dort, Temple University

Mosston's Spectrum of Teaching Styles is a theoretical framework consisting of eight teaching styles, Styles A through H, all derived from the same decision-making model. Each style has a unique structure based on who, teacher or student, makes which decisions. Decisions systematically shift between teacher and learner to form eight distinct, yet connected, teaching styles which provide alternative models of teaching behavior between the theoretical limits of complete teacher and complete learner decision-making. The Spectrum is a particularly useful framework for research on teaching for it is, at the same time, universally sound yet practical in its application. In this study, three of Mosston's teaching styles were examined as to their impact on motor skill acquisition, social skill development and self-concept enhancement of fifth grade children. This was an expansion of an earlier study by the same authors. 136 children from two schools, one innercity and one suburban, were randomly selected and assigned to a control group or one of the three treatment groups: Style B (the Practice Style), Style C (the Reciprocal Style), and Style E (the Inclusion Style). Performance data on a simple hockey accuracy task were collected prior to, midway through, and following practice trials under learning conditions provided by these three teaching styles. The control group received no practice trials. Selected affective characteristics were also studied. 3 X 2 X 2 (treatment X setting X sex) ANOVAs for repeated measures were completed and revealed that: 1) All three groups learned the skill and learned it comparably well. 2) Certain groups of "special" children (e.g., low-achieving children) were found to benefit differentially from the three treatments. 3) Differences in learning associated with either setting or sex were not found to be significant. And 4) changes in self-concept enhancement and social skill development were not found to result from these relatively short-term treatments. In conclusion, the Spectrum does appear to offer alternative approaches to effective teaching.

Michael Goldberger
Physical Education Department
Temple University, Philadelphia, Pa.

April 25, 1982
1.30 p.m.

LONG-TERM EFFECTS OF LECTURE-LABORATORY PHYSICAL EDUCATION.

David R. Laurie, Scott Slava, and Charles B. Corbin, Kansas State University

Because of the inadequacies of traditional college physical education and because of the need to help college students make intelligent lifetime decisions concerning exercise and physical fitness, many colleges and universities have adopted lecture-laboratory (concepts) courses during the last 10 to 15 years. Though short-term studies have indicated that students give good ratings to these courses, and that they result in knowledge and attitude changes for those who complete them, there is little evidence to indicate the long-term effects of such courses. The purpose of this study was to evaluate the knowledge, attitude, and activity behavior of college graduates who have completed a lecture-laboratory (concepts) course during their undergraduate study. Serving as controls were college graduates of the same university who transferred to the university and who received credit for a traditional rather than a conceptual course. Both groups were compared to college graduates who "quizzed out" of the concepts course rather than enrolling in the class. From all Kansas State University graduates of the class of 1976, fifty (25 male and 25 female) were selected randomly from those completing the concepts course, fifty from those who "quizzed out", and fifty from those who completed a more traditional class in physical education. Similar groups were selected from the class of 1978. All those selected as subjects received a questionnaire containing a knowledge test, an attitude test, and an activity checklist. Two hundred seven of the 300 questionnaires distributed were returned. MANOVA analysis indicated main effect differences among groups who completed physical education requirements in alternate ways. ANOVA and Chi Square analyses indicated that the Concepts groups were more active than the other groups. Both the Concepts and "quiz out" groups were more knowledgeable than the groups taking more traditional physical education courses. The magnitude of the differences between groups appears to be greater among subjects having graduated in 1976 as compared to 1978. The results of the study seem to support the long-term value of a college level concepts course in physical education.

David R. Laurie
Department of H.P.E.R.
Kansas State University
Manhattan, Kansas 66506

April 25, 1982
1:45 p.m.

CORRELATION BETWEEN ACADEMIC LEARNING TIME AND ACHIEVEMENT IN A NOVEL SKILL EXPERIMENTAL TEACHING UNIT. Janice Young, Iowa State University; Michael W. Metzler, Virginia Polytechnic Institute and State University

The purpose of this study was to measure student achievement in a 20-minute Experimental Teaching Unit (ETU) as a function of accrued amounts of Academic Learning Time (ALT). An ETU is a standardized-content teaching unit, used to analyze teacher and student behavior in a structured setting. In order to reduce the effects of prior student learning, the selected task is a novel one--in this study the task consisted of a combined hockey/golf skill in which the students learned to hit a ball into a hoop placed 30 yards away. The ETU begins with a short pre-test, followed by the lesson itself and then a post-test. Teachers are allowed to present the material and design the instructional setting in any manner they wish. Only the content is regulated. The subjects in this study were 90 elementary students and four teachers. Each lesson was videotaped entirely, keeping all students in view. Teacher verbal behavior was recorded with a remote microphone. Following the taping, each student was observed with the Academic Learning Time-Physical Education instrument to measure their accrued ALT-PE. Student gain scores were then correlated with ALT-PE, using a Pearson-product correlation. Several other related measures of student time-on-task were also correlated with gain scores. Correlations between pre-and post-test scores indicate that student prior ability in the skill and subsequent achievement were not related. While the correlation between achievement and ALT-PE was not strong, it was statistically significant and in the proper direction--negative, showing a relationship between increased ALT and reduced scores in post-test measures.

Janice Young
New PEB
Iowa State University
Ames, Iowa 50011

April 25, 1982
2:00 p.m.

CURRICULUM REQUIREMENTS FOR A COACHING MINOR FOR PHYSICAL EDUCATION MAJORS AND NON-MAJORS AT COLLEGES AND UNIVERSITIES WITH ACCREDITED TEACHER EDUCATION PROGRAMS IN THE MIDWEST DISTRICT OF AAHPERD. Jerome J. Stieger, University of Cincinnati

The purpose of this study was to determine the curriculum requirements for coaching minors at colleges and universites with accredited teacher education programs in the midwest district of the American, Alliance for Health, Physical Education, Recreation and Dance. Ninety of the one-hundred twenty institutions (seventy-five percent) contacted returned the questionnaire and fifty-five percent of them indicated they offered some type of coaching option. Ninety-two percent of the schools with coaching programs included them with their questionnaires. The most commonly used terms to describe the options were: minor, endorsement, concentration and institutional certification. Although none of the states included in the investigation presently requires coaching certification for coaches, some are considering such action. Hour requirements for the various options range from a low of twelve quarter hours to a high of over fifty. The majority are in the upper twenty and low thirty range. The most commonly required group of courses is in the area of theory and techniques of coaching. Ninety-five percent of the schools require a minimum of one course from this category. Courses in the kinesiological science area were the second most frequently required group. Kinesiology and physiology of exercise were both required by over seventy percent of the schools. Fifty-two percent of the institutions require a practicum experience of some type. This can include assisting as a coach on the college or interscholastic level. First aid and some type of care and prevention of athletic injuries are required in over half of the programs. Some type of psychology of coaching and an organization and administration of athletics course are mandatory in approximately forty-five percent of the schools. Forty percent require a course on the organization and administration of physical education. The results indicate that although there are similarities in the courses required for the various coaching options, the hour requirements vary a great deal. Emphasis is placed on developing a solid foundation in the kinesiological sciences and the theory and techniques of coaching.

Jerome J. Stieger
Physical Education Program
University of Cincinnati 45221

April 25, 1982
2:15 p.m.

INTERSCHOLASTIC ATHLETIC PARTICIPATION AND DELINQUENT BEHAVIOR.

Jeffrey O. Segrave, Skidmore College; Douglas N. Hastad, Northern Illinois University

The purpose of this study was to further investigate the relationship between interscholastic athletic participation and delinquent behavior. More specifically, the study attempted to compare the delinquent behavior of athletes and nonathletes when the sample was classified by age, gender, racial background, residential background, and social class, and when delinquent behavior was categorized by type of offense. Although several studies have previously reported a negative association between athletics and delinquency, a wide variety of variables, including age, gender, racial background, residential background and type of offense, have not been taken into account in the formulation of a more refined statement about the relationship between athletics and delinquent behavior. Self-report questionnaires were administered to a sample of 1,935 juveniles from eight selected high schools. The delinquent behavior offenses included petty theft, car theft, theft, vandalism, and physical assault. For the purpose of statistical analysis, the chi-square and gamma techniques of association were used ($p= .05$). Overall, the results indicated that athletes reported significantly less delinquent behavior than nonathletes. The relationship was particularly marked on the more serious items of theft, vandalism and physical assault. The data also indicated a negative association between athletic participation and delinquent behavior across all subsamples and for all types of offense. Significant differences, however, were found only among the young age group, males and females, whites, and rural and urban youth. Once again the relationship was particularly marked for items of theft, vandalism and physical assault. The results of the study suggest that the deterrent effect of athletic participation on delinquent behavior appears to generalize across age, gender, racial background, residential background, and social class and for all types of offense, particularly the more serious offenses of theft, vandalism and physical assault.

Jeffrey O. Segrave
Department of P.E. and Dance
Skidmore College
Saratoga Springs, NY 12866

April 25, 1982
2:45 p.m.

PREDICTION OF BATTING SUCCESS. A. Craig Fisher, Ithaca College; Thomas W. Ford, Ithaca College; Deborah A. Wuest, Ithaca College

The relationship of predictor variables (attention, visual disembedding, competitive trait anxiety, locus of control, and self-perception) and batting outcomes (batting average, strikeouts, and runs batted in) was investigated. High school and college baseball athletes were administered the attentional items of the Test of Attentional and Interpersonal Style (TAS), test of batting attentional style (T[illegible]S), Group Embedded Figures Test (GEFT), Sport Competition Anxiety Test (SCAT), personal behavior scale (PBS), Index of Adjustment and Values (IAV), and personal assessment questionnaire (PAQ). Coefficient alpha reliability for the TAS scales ranged from .62 to .74, while the TBAS scales ranged from .61 to .75. Multi-variate analysis of variance revealed that the TBAS differentiated between high and low batting averages groups while the TAS did not. Neither the TBAS nor TAS differentiated between high and low strikeout groups or high and low runs batted in groups. Stepwise multiple regression revealed that batting averages were predicted by the broad external, broad internal, underinclusive, and overloaded internal focuses of attention; locus of control; visual disembedding; and perceived ability and success. Strikeouts were predicted by the broad internal and overloaded internal focuses of attention; visual disembedding; and perceived ability and success. Runs batted in were predicted by the broad internal and underinclusive focuses of attention, and perceived ability and success. Overall, batting success was predicted by high perceived ability and success, internal locus of control, low ideal self, low broad external focus, low narrowed attentional focus, and externally overloaded focus of attention.

A. Craig Fisher
School of HPER
Ithaca College
Ithaca, NY 14850

April 25, 1982
3:00 p.m.

EFFECTS OF INFLUENCE CONDITIONS ON JUDGING GYMNASTICS AND PSYCHOLOGICAL CORRELATES TO INFLUENCE EFFECTS. Charles J. Ansorge and John K. Scheer, University of Nebraska-Lincoln

The investigators previously determined that susceptibility of gymnastics judges to being influenced by their expectations was related to locus of control. "External" judges tend to be influenced by their expectations more than do "internal" judges. The purposes of this investigation were to (1) determine the effects on judges' scores of two influence conditions, and (2) determine the relationship between the degree to which judges were influenced and selected personality variables. Subjects were 24 male gymnastics judges, 12 nationally certified and 12 high school certified. Half of the nationally certified judges were randomly assigned to an upward-modified influence group. The remaining subjects were assigned to a downward-modified influence group. All subjects scored the routines on a color ETV videotape of a high school dual gymnastics meet for which a set of criterion scores had been provided by a team of expert judges with international experience. An attempt was made to influence judges' scores either upward or downward in the manner described below. After judges' scores from the upward-modified influence group were collected for each routine, the head judge of the actual meet briefly flashed a falsified score, elevated from the criterion score, in the background of the video-tape during the public address announcement of the next gymnast. The subjects in the downward-modified influence group viewed a second videotape of the meet, but the scores appearing on the tape had been lowered from the criterion scores. Scores were raised and lowered from criterion scores by the allowable FIG range. Each of the subjects received $25.00 for judging the meet. At the conclusion of the judging, each subject completed the Rotter Locus of Control Inventory and the Edwards Personal Preference Schedule (EPPS). A 2 x 2 x 2 ANOVA was utilized to determine the effects of the influence conditions, experience conditions, and locus of control conditions on scoring. Pearson product-moment correlations were also computed to determine the relationship between selected EPPS variables and susceptibility to being influenced. A significant difference ($p < .05$) was found between scores in the two influence conditions. The degree to which judges were influenced was also found to be related to various personality variables.

Charles J. Ansorge
School of HPER
University of Nebraska
Lincoln, Nebraska 68588

April 25, 1982
3:15 p.m.

THE EFFECT OF EXPERIENCE WITH AN AUDIENCE, TYPE OF AUDIENCE, AND METHOD OF EVALUATION ON THE LEARNING OF A COMPLEX MOTOR TASK.

Frederick K. Whitt, University of Tennessee, Knoxville

Researchers have studied issues regarding audience effect upon motor skill performance, but have differed in their investigations concerning prior experience with an audience, status of the audience, and whether the performer has been evaluated directly or indirectly. The purpose of this study was to investigate the effect of: (a) prior experience with an audience, athlete or non-athlete; (b) status of the audience, expert or non-expert: and (c) type of evaluation by an audience, direct or indirect, on the learning of a complex motor task. Twelve trials of 20 seconds' duration at 60 rpm's were administered on the pursuit rotor instrument to each subject. The averages and variability of time on target and error scores were grouped and calculated for each of four blocks. Subjects were 96 male volunteers, 48 with (athletes), and 48 without (non-athletes) previous motor performance experience with an audience. Each group of 48 subjects was randomly assigned to four treatment groups ($n = 12$): (a) expert audience, direct evaluation; (b) expert audience, indirect evaluation; (c) non-expert audience, direct evaluation; and (d) non-expert audience, indirect evaluation. The 2x2x2x4 ANOVA with repeated measures on the last factor, and appropriate post hoc tests, were used to analyze the data and produced the following results: (a) subjects with previous audience experience in performing motor skills were significantly better ($p < .01$) than subjects with no previous audience experience in performing motor skills, when observed by an expert audience with direct evaluation on mean time on target; (b) for all dependent measures, none of the groups were significantly different at Block 1; but significant interaction effects by blocks were found for the following: (1) audience x blocks for variability of error, with audience experience groups producing more consistency in performance than non-audience experience groups, (2) audience x evaluation x blocks for mean time of target, with audience experience groups evaluated directly, performing better than other groups on time on target. The primary contribution of the study demonstrates that the most significant factor in performing motor skills, when an audience is present, is prior experience with an audience.

Frederick K. Whitt
School of HPER
University of Tennessee
Knoxville, TN 37996-2700

April 25, 1982
3:30 p.m.

THE EFFECTS OF AGE AND NUMBER OF DEMONSTRATIONS ON MODELING OF FORM AND PERFORMANCE. Deborah L. Feltz, Michigan State University

This study was designed to investigate the effects of age and number of demonstration on both form (strategy employed) and physical performance on a Bachman ladder-balance task. College-age (n=60) and elementary-age females (n=60) were compared under four modeling conditions consisting of no, four, eight, and 12 demonstrations in an Age Group x Demonstration Group x Trial Blocks (2 x 4 x 2) repeated measures MANOVA. Results indicated that college-age students had higher performance and form scores than elementary-age students. Only form differentiated the four demonstration groups. Participants receiving 12 demonstrations had higher form scores than the control participants. Form scores were analyzed in a discriminant function analysis to determine which of five form components differentiated the four demonstration groups. Results also revealed that climbing quickly was the component of form that differentiated the groups the most. It was concluded that matching form by the learner may be a more effective measure of modeling effects rather than inferring modeling from performance, especially in the initial stages of learning. In addition, it appears that the number of demonstrations needed to create modeling effects is task specific and dependent on the length of the practice period.

Deborah L. Feltz
HPE - Youth Sports Institute
Michigan State University
East Lansing, Michigan 48824

April 25, 1982
4:00 p.m.

INFERRING EFFICIENCY OF PERCEPTUAL PROCESSING FROM DEVIATIONS IN THE RANGE EFFECT.

William S. Husak, California State University, Long Beach

Revived interest in perceptual organization has recently been demonstrated by the reporting of numerous studies relating this area to retention of movement information. A common finding in movement reproduction experiments has been the range or central tendency effect (Laabs, 1979). The purpose of the present study was to determine if the quality of serial movement retention would be reflected by alterations in the range effect. Forty-five subjects were administered a serial position task consisting of nine movements. Three groups were formed and distinguished by the type of mneumonic label (random, temporal or spatial) attached to each movement in the series. Reproduction of the items in the movement series was accomplished in a free recall manner. Results of the groups by movement distance analyses for constant error demonstrated the expected range effect for the random and temporal label groups. No range effect was observed for the spatial label group, which demonstrated a lack of biasing across the whole range of movements. These findings suggested that various types of mneumonic labels result in differing qualities of movement retention. Furthermore, differences in perceptual processing of movement information into a motor memory may be manifested by changes in the range effect. It is suggested that decreases in the range effect indicate enhanced processing.

William S. Husak
Physical Education Department, CSULB
Long Beach, California 90840

April 25, 1982
4:15 p.m.

EXPERIENCE, CONTEXTUAL INTERFERENCE AND ELABORATION EFFECTS ON THE FLEXIBILITY OF MEMORY.

Emily H. Wughalter, New York University

The purpose of this study was to determine how athletic experience, contextual interference and elaboration affect acquisition, retention, and transfer of three motor skills presented as closed or open skills. Subjects were 32 females: 16 subjects were experienced in softball and rugby, and 16 novice subjects were selected from physical education basic fitness classes. Half of the subjects practiced elaborations, in the form of rhymes, prior to acquisition. Each subject received 54 acquisition trials on three tasks in either a blocked or random presentation order. Following a ten-minute retention interval, subjects performed six test trials on two novel tasks. On the next consecutive day, subjects performed nine recognition trials followed by nine recall trials of the acquisition tasks. Reaction time, movement time, total time and error data were collected on every trial throughout testing. Knowledge of results in the form of movement time and errors were indicated verbally to each subject on every trial of acquisition. Fifteen separate analyses of variance were used to analyze the results of the study. The results supported the notion that experimenter-provided elaborations facilitated performance in the random context for novice subjects in transfer and retention. Battig's (1979) contention that learning in contexts of high interference facilitates memory was supported for two tasks in recognition and one task in recall. Additionally, support for Tulving's encoding-specificity principle was provided. Subjects performed transfer and retention trials faster when these tests were presented in the same context as the acquisition test. Experienced subjects performed faster movement times in acquisition and test sessions than novice performers. It was concluded that although learning is often retarded by incorporating a context that matches environmental demands, the notion that memory is facilitated by learning in complex contexts was supported. Furthermore, experimenters and teachers could facilitate processing of information for new learners by incorporating elaborative strategies.

Emily H. Wughalter
Prog. in Physical Educ. and Sport
New York University
New York, New York 10003

April 25, 1982
4:30 p.m.

EFFECT OF DIFFERENT QUANTITIES OF VIDEOTAPE FEEDBACK ON PERFORMANCE AND STATE ANXIETY DURING EARLY AND LATE LEARNING.

Raymond R. Ferreira, The Johns Hopkins Medical Institutions

Eighty subjects were randomly assigned to five treatment groups: (a) control, (b) videotape feedback four times during early learning (first ten trials), (c) videotape ten times during early learning (d) videotape feedback four times during late learning (second ten trials), and (e) videotape feedback ten times during late learning. The subjects entered the motor learning lab where they completed Speilberger's State-Trait Anxiety Inventory (STAI). The subjects then performed 10 practice trials, and the STAI completed a third time. The 20 performance trials were grouped in pairs to form 10 average performance scores. The Trait Anxiety Measure was used as a covariate in analysis of the data. The results were as follows: Early videotaped treatment groups performed significantly better than the control and late videotape treatment groups for performance scores two and five. There was significant difference between the control group and the four videotape treatment groups for performance scores seven and ten. All treatment groups performed better than the control group. Early videotape treatment subjects has significantly higher state anxiety levels than late videotape subjects or control subjects, immediately prior to the first ten practice trial (early learning). Late videotape treatment subjects had significantly higher state anxiety levels than early videotape subjects or control subjects, immediately prior to the last ten practice trials (late learning). The following conclusions were drawn: Videotape feedback,whether introduced during early or late stages of learning, increased a subject's level of performance. No increase or decrease in learning or performance resulted when the number of videotape replays increased from four to ten. Subjects exhibited increased state anxiety when told they would be videotaped. The combination of videotape feedback and increased state anxiety level resulted in performance increase.

Raymond R. Ferreira, Ph.D.
Denton A. Cooley Center
Baltimore, Maryland 21205

April 25, 1982
4:45 p.m.

ACQUISITION OF A MOTOR TASK AS A FUNCTION OF THE SIMILARITY OF PRIOR LEARNING.

Linda Ho, Southern Illinois University

Research by Dey (1977) and Stelmach (1969) suggests that an inverse relationship exists between proactive interference (PI) and task similarity for motor skills; that is, increased similarity among tasks results in less PI. The present study investigated the effects of prior acquisition of either 5 high similarity tasks or 5 low similarity tasks on the acquisition of 2 new tasks which varied in similarity to the acquisition tasks. Half the subjects (16) were given 125 acquisition trials in an unsystematic sequence (Random acquisition). Half the subjects were given trials in a systematic sequence whereby a block of trials were given on Task A before proceeding to Task B (Blocked acquisition). Following a 10-minute retention interval, subjects were given a total of 12 trials on 2 new tasks in both a random and blocked presentation sequence. The results indicated that the prior acquisition of high similarity tasks in a blocked acquisition sequence interfered with the subsequent acquisition of a highly similar new task, but did not affect subsequent acquisition of a less similar new task. This is not consistent with the findings of earlier motor skills research (Dey, 1977; Stelmach, 1969). In addition, Ss who originally learned in a random acquisition sequence showed no signs of interference for acquisition of either new task. The present data thus suggest that proactive interference may be positively related to task similarity, however, presentation of tasks in a random sequence may prevent the build up of proactive interference.

Linda Ho
Department of Physical Education
Southern Illinois University
Carbondale, Illinois 62901

April 25, 1982
5:00 p.m.

RELATIONSHIPS OF INTERACTION BEHAVIOR PATTERNS OF STUDENT TEACHERS AND THEIR COOPERATING TEACHERS.

Victor H. Mancini, Ithaca College; Jennifer Goss, Vassar College; Patricia A. Frye, Ithaca College

Throughout the field of education, student teaching is often regarded as the most important single experience in the professional preparation of a teacher. Because of the close association between the student teacher (ST) and the cooperating teacher (CT) during this time, it has been hypothesized that the ST may become more like the CT. This study was undertaken to investigate this hypothesis, with two specific questions: (1) Do verbal and nonverbal behavior patterns of STs change during the student teaching period? and (2) If so, do the patterns become more like the CTs' behavioral patterns as the student teaching period progresses? Subjects included 15 elementary physical education STs and their CTs. Each subject was videotaped for two entire class periods, CTs prior to the arrival of the STs, STs once the first two weeks of student teaching and again in the last two weeks. Cheffers' Adaptation of Flanders' Interaction Analysis System (CAFIAS) was used to describe both verbal and nonverbal teacher-pupil behavioral patterns. Multivariate analysis of variance (MANOVA) procedures on the eight selected CAFIAS variables indicated significant ($p < .05$) change in ST behaviors during the student teaching period. Discriminant function analysis indicated that teacher use of verbal questioning accounted for the largest amount of between groups variance in this MANOVA. On the basis of significant canonical correlations and MANOVAs it was concluded that there was a significant relationship between the behavioral patterns of CTs and STs. However, the STs' behavioral patterns became less like their CTs' during the student teaching period, indicating that CTs failed to have a significant direct influence on ST behavior. CTs' predominant behavior pattern was determined to be one of information-giving followed by directions, which led to predictable pupil response. STs' predominant behavior patterns included more acceptance, praise, and questionning of their pubils' ideas and actions, which led to more interpretive pupil responses.

Dr. Victor H. Mancini
School of HPER - Ithaca College
Ithaca, NY 14850

April 26, 1982
8:45 a.m.

A DESCRIPTIVE ANALYSIS OF QUESTIONING SKILLS IN SECONDARY PHYSICAL EDUCATION CLASSES.

Stephen J. Virgilio, University of New Orleans

The purpose of this study was to descriptively analyze questions used in secondary physical education classes by both the teacher and the student. Fifteen college seniors majoring in physical education were trained to use the Virgilio Physical Education Question Inventory (VPEQI). A pilot study revealed an interobserver reliability of 95%. A total of fifty classes were observed for this study using fifteen different junior and senior high schools. The system involved having a trained observer make live observations in secondary physical education classes and classify each question asked by teacher and student into specific categories. The categories reflected a range of cognitive, affective and psychomotor processes termed as substantive questions. The non-substantive categories included discipline, administrative and personal types of questions. Each major classification included several additional categories that allow for a more accurate descriptive analysis of the questions. A category was also used to determine whether a question solicited a verbal or non-verbal response. The results of this study paralleled similar investigations found in classroom studies. Both teacher and student asked more memory questions as compared with the higher cognitive processes of application, analysis, synthesis, and evaluation. The majority of the questions were categorized in the non-substantive areas (75%). A large amount (60%) were under the administrative category with the greatest emphasis in roll call types of questions. The substantive section accounted for 25% of all the questions. The major category was the cognitive area--soliciting a verbal response (15%), with the teacher asking the greatest number of questions. The affective category yielded 4% and the psychomotor 7% of the questions asked in the substantive areas. Within the fifty classes observed, a total of 275 questions were coded using the VPEQI, an average of 5.5 questions per class. The teacher asked most of the questions (72%) while the students asked 28%. The results of this study indicated the failure of secondary physical education teachers to facilitate the development of thought and skill processes through the use of questioning techniques in the cognitive, affective and psychomotor areas. Future research may be needed to inventory the questioning skills of elementary physical education classes.

Stephen J. Virgilio
Department of HPE
University of New Orleans
New Orleans, LA 70148

April 26, 1982
9:00 a.m.

THE EFFECT OF FEEDBACK ON THE ACADEMIC LEARNING TIME (PHYSICAL EDUCATION MOTOR) OF STUDENT TEACHERS. Paul C. Paese, Southwest Texas State University

The purpose of this study was to assess the effect of feedback on the ALT-PE(M) of two student teachers in a secondary physical education setting. Feedback was in the form of verbal and written feedback, which consisted of information given to the student teachers after each class observed from the data collected from the ALT Observation Coding System. Also strategies were discussed on how the teacher might decrease management time and increase the motor responses of the class. The study consisted of a baseline phase and one intervention phase of feedback. Two post checks were made on each student teacher following intervention. The data were analyzed via multiple baseline across subjects and by using the line of best fit. Reliability was measured by the scored interval method of calculation. The results indicated that both subjects demonstrated a behavior change in the desired direction, thus increasing the dependent variable (ALT-PE(M)) over baseline conditions following the intervention of the independent variable. The following conclusion are also justified.

1. Feedback in the form of information given to the student teachers after observations using the ALT coding instrument, and strategies to decrease management and increase individual motor responses led to an increase in the dependent variable when compared to baseline.
2. ALT-PE(M) increased from an average of 7.5% during baseline to 19% during intervention. Post checks taken two weeks after the study was completed showed a 17.5% ALT-PE(M).
3. Engaged motor responses increased from an average of 18.5% during baseline to 43% during intervention.
4. ALT-PE(M) increased on an average from under 2 minutes during baseline to 4 3/4 minutes during intervention.
5. Assessment of the multiple baseline graph allows a statement of causality to be made. A functional relationship can also be concluded after analysis and use of the line of best fit. (Baer and Parsonson)
6. The ALT coding instrument is a valuable tool for supervisors in helping to assess teacher performance and to improve instruction.

Paul C. Paese
Southwest Texas State University
San Marcos, Texas 78666

April 26, 1982
9:15 a.m.

ASSESSING SIMILARITY PROFILES OF STUDENT TEACHERS. Dewayne J. Johnson, The Florida State University; Virden Evans, Jerome Quarterman, and Allison Figaro, Florida A&M University

The purpose of this investigation was to assess personality profiles of student teachers majoring in physical education and student teachers majoring in areas other than physical education. Additionally, differences by sex and ethnic background were analyzed. Catell's 16PF Questionnaire was administered to 108 student teachers, 66 majoring in physical education and 42 majoring in other academic areas. The data were analyzed using two-way ANOVA, factor analysis, and discriminant analysis. Differences were found by sex, race, and major on 10 of the 16 factors. Physical education majors were more tough minded than other majors while white females were more intelligent and white males displayed more emotional stability than other groups. Factor analysis identified 6 significant factors. Using the factor score coefficient, factor scale scores were computed for the 6 factors and then discriminant analysis was used to determine group differences between physical education majors and majors from other areas. The analysis identified two factors, venturesome and tense, as factors that provided differences between groups.

Dewayne J. Johnson
Dept. of MS&PE
The Florida State University
Tallahassee, Florida 32306

April 26, 1982
9:30 a.m.

A COMPARISON OF INTERACTION BEHAVIOR PATTERNS IN ELEMENTARY PHYSICAL EDUCATION CLASSES DIFFERING IN ATTITUDE TOWARD PHYSICAL EDUCATION.

Patricia A. Frye, Ithaca College; John Furey, Pine Bush (NY) High School; Victor H. Mancini, Ithaca College

The interaction behavior patterns of elementary physical education classes with a more positive attitude toward physical education were compared to the interaction behavior patterns of elementary physical education classes with a less positive attitude toward physical education. Subjects included 20 elementary physical education classes from the central New York area. Each participating class was videotaped twice on predetermined days, and the Revised Form of the Children's Attitude Inventory Toward Physical Education (RFCAIPE) was administered to the students in the participating classes on the occasion of the second taping. Classes were divided into groups classified as more positive attitude and less positive attitude based upon class means on the RFCAIPE. Videotapes of the 20 participating classes were coded using Cheffers' Adaptation of Flanders' Interaction Analysis System (CAFIAS). Multivariate analysis of variance revealed significant differences in the interaction behaviors of classes differing in attitude toward physical education at the .05 level of significance. Univariate analyses of variance revealed the groups to be significantly different on the following CAFIAS variables when the variables were considered independently: teacher use of verbal acceptance and praise, teacher use of verbal questioning, and teacher use of nonverbal questioning. Discriminant function analysis revealed teacher use of verbal acceptance and praise and teacher use of verbal questioning accounted for 84.42% of the variance between the two groups. It was concluded that there were significant differences in the classroom behaviors of elementary physical education classes with differing attitudes toward physical education.

Dr. Patricia A. Frye
School of HPER - Ithaca College
Ithaca, NY 14850

April 26, 1982
9:45 a.m.

A COMPARISON OF HYDROSTATIC WEIGHING AT RESIDUAL VOLUME AND TOTAL LUNG CAPACITY IN CHILDREN. Thomas Wells, Carol Reynolds, and George T. Jessup, Texas A&M University

Measurement of body density (Db) in children using hydrostatic weighing (HW) has been performed by several researchers. The HW has been recorded as the weight under water at the time of maximal expiration, or residual volume (RV). Recently, Weltman, et.al (1981) performed HW on adult males and females using the (RV) technique, but they also determined the HW of each subject with a maximal inspiration, or total lung capacity (TLC). Although there was a statistically significant difference between the two methods, there was a high correlation (r=0.95) between the two measures in determing Db. Therefore, the purpose of this study was to determine if there was a difference in Db measurements in pre-pubescent males as determined by HW at RV as compared to HW at TLC. The subjects, twenty males, 9-12 years of age (X age: 10.0), were initially given a Pulmonary Function test to determine their forced vital capacity (FVC). Three trials were taken, with the highest reading used as the measure of FVC. Determination of RV using the Van Slyke method followed, and this value was then added to the value for FVC to obtain each subject's TLC measure. Each subject then entered the hydrostatic weighing tank where HW was recorded at RV for 5 trials and at TLC for 2 trials. Db for each subject was then computed using the highest RV weight and the highest TLC weight. Results indicated that there was a statistically significant difference (p=.05) in Db as determined by RV (1.027 g/ml) vs TLC (1.039 g/ml). Although a significant difference resulted, there was a simple linear correlation (r=0.89) between the two Db measures. As a result it was concluded that hydrostatic weighing with children who are uncomfortable in the water may be enhanced if the TLC method is used, although it is obvious that further studies are needed.

Thomas Wells, Dept. Hlth and P.E.
Texas A&M University
College Station, Texas 77843

April 26, 1982
10:15 a.m.

A MEASUREMENT SCHEDULE FOR ARCHERY SCORING. Jack L. Shannon, North Carolina State University; Jimmy H. Ishee and Peter W. Everett, The Florida State University

The commonly used competitive rounds of archery are seldom appropriate for use in beginning archery classes for evaluation purposes. Therefore, the purpose of this study was to determine an appropriate measurement schedule for beginning collegiate archery classes while comparing male and female scores. The subjects were 147 males and 41 females enrolled in beginning archery classes at North Carolina State University. The scores for the analysis consisted of five consecutive ends of six arrows from both twenty and thirty yards. The shooting at each distance occurred on separate days with all ends recorded (no practice ends were given). Based on the results of analysis of variance, ends were eliminated that maximized end-to-end variation, after which the analysis was repeated with the consecutive ends that best represented the mean performance of the subjects. The reliability of the average of the ends was estimated by utilizing the intraclass correlation coefficient. The male and female scores were compared at each distance by employing $\underline{t}$ tests. When utilizing all five ends, the male and female data combined resulted in a significant $\underline{F}$ ratio, as did the data analyzed separately. The first ends, from both twenty and thirty yards, were eliminated due to their differences from the remaining ends. The resulting analysis of the remaining four ends produced no significant differences among the ends of the male or female data. The reliability coefficients for the males were .84 and .83 at twenty and thirty yards respectively, while the female coefficients were .86 and .71. The average end of the males was significantly higher than the females at both twenty and thirty yards. In beginning collegiate archery classes, one practice end appears necessary before scoring with one or more of the following four ends suitable for evaluation purposes. Also, male and female data should be interpreted separately.

Jack L. Shannon
Department of PE
North Carolina State University
Raleigh, North Carolina 27650

April 26, 1982
10:30 a.m.

RANKINGS OF UNIVERSITIES AND COLLEGES BASED UPON SELECTED AAHPERD PUBLICATION RATES. Dale Mood, University of Colorado; James Morrow, University of Houston

Various means have been used by national organizations (e.g., American Educational Research Association and the Educational Testing Service) to determine ratings of "prestigious" universities and colleges. One method is to determine the number of journal articles published by faculty members. The purpose of this investigation was to arrive at a hierarchy of institutions based upon the number of articles published within The Journal of Physical Education and Recreation and The Research Quarterly for Exercise and Sport for the years 1977-1980. Institutions were awarded points based upon the number of authors of an article. For example, articles authored by one individual resulted in awarding an institution one point, while an article with four authors from four different institutions resulted in each institution receiving one-fourth of one point. Data from the JOPER and RQES are reported separately because of the differential nature of the two journals. There were 291 different institutions represented by at least one author in the JOPER. The ten institutions receiving the highest point values were: 1)University of Illinois, 2)University of North Carolina at Greensboro, 3)Purdue University, 4)University of Houston, 5)Penn State University, 6)State University of New York at Brockport, 7)Temple University, 8)University of Nebraska, 9)University of Wisconsin, and 10)Ohio State University. Data from the RQES indicated that 161 different institutions were represented by at least one author. The top ten institutions with regard to points awarded were: 1)University of Wisconsin, 2)University of Illinois, 3)University of Iowa, 4)University of Houston, 5)Texas A & M University, 6)Penn State University, 7)Kansas State University, 8)Kentucky University, 9)University of Maryland, and 10)University of Southern California. Results were compared to other means of rating colleges and universities. It is apparent that the various hierarchies obtained depend upon the type of rating system utilized, suggesting that no single rating method fully describes the professional reputation of each institution.

Dr. Dale Mood
Dept. of P.E. & Recreation
University of Colorado, Box 354
Boulder, CO 80309

April 26, 1982
10:45 a.m.

SALARY COMPARISON OF FEMALE AND MALE INTERCOLLEGIATE BASKETBALL COACHES: AN EQUAL OPPORTUNITY STUDY.*

Sue G. Mottinger, Texas Woman's University

The investigation was made to determine if sex discrimination in salaries of intercollegiate basketball coaches existed in selected coeducational institutions of higher education in the U.S. The Ss studied were 53 paired female and male (n=106) head basketball coaches from Division I AIAW and NCAA institutions. The faculty representatives from the institutions completed a questionnaire during the 1980-81 academic year. Data collected included the following variables: (a) coaches' salaries, (b) coaches' salaries per number of participants, (c) coaches' salaries per number of season games, (d) coaches' salaries versus win/loss record, (e) degree held, (f) experience in coaching, and (g) number of auxiliary personnel supervised. A multivariate analysis and Chi-Square were utilized to determine if sex discrimination with respect to the salaries existed between the coaches. A multiple regression was used to determine the significance of difference between the actual salaries versus the predicted salaries. Significant differences ($p < .05$), were found between the coaches' salaries, salaries per participants, salaries per games coached, salaries per win/loss record, and actual versus predicted salaries. Salaries related to coaching experience, auxiliary personnel supervised, and academic degree held were non-significant ($p > .05$). Even though an institution may claim that it can justify its pay scales for coaches, it may not be in compliance with federal laws requiring equal employment opportunity. It was determined that the coaching positions investigated in this study were substantially equal in skill, effort, and responsibility. The exceptions in the Equal Pay Act of 1963 (29 U.S.C. 206 [d] [1]) that substantiate legitimate differences in payment were investigated and the results lent further support to the contention that the positions studied were substantially equal in seniority, quantity and quality, and any other factor not based on sex. Based upon the findings, it may be concluded that the difference in salary between the female and male basketball coaches in Division I colleges and universities may be attributable to sex-based factors. The male coaches were subject to higher salaries than the female coaches without any reasonable basis for that distinction except possibly for years of experience and number of auxiliary personnel supervised.

*This investigation was conducted for a dissertation under the direction of Barbara E. Gench, Ed.D., at the Texas Woman's University.

Sue G. Mottinger
PO Box 23717 Texas Woman's University
Denton, Texas 76204

April 26, 1982
11:00 a.m.

BODY COMPOSITION AND ANTHROPOMETRIC CHARACTERISTICS OF COMPETITIVE FEMALE BODY BUILDERS. P.S. Freedson, University of Massachusetts; A.B. Loucks, University of California, Santa Barbara; R.N. Girandola, University of Southern California

The purpose of this investigation was to examine percent body fat, skeletal structure and body segment proportionality in 10 competitive female body builders (BB) ($\bar{X}$ age ± SD = 27.1 ± 5.21 yrs; $\bar{X}$ height ± SD = 160.8 ± 5.52 cm; $\bar{X}$ weight ± SD = 53.8 ± 4.06 kg). Lean body mass (LBM) and percent body fat were estimated from hydrostatic determination of body density (residual volume - oxygen dilution procedure). Bone diameters, skinfolds and circumferences were measured using standard anthropometric techniques. The mean (± SD) percent fat was 13.3 ± 3.52 percent (range = 8.0 to 18.3 percent); $\bar{X}$ LBM ± SD = 46.6 ± 3.12 kg). With the exception of female gymnasts, the female BB from the present study were 3-4 percent shorter, 4-5 percent lower in total body weight and 7-10 percent lower in relative fat in comparison to published data on other female athletes. The most striking compositional characteristic of the women BB in comparison to other female athletic groups was the dramatically larger lean fat ratio (L/F) ($\bar{X}$ L/F = 7.1 for BB and 4.3 for other female athletes). These data indicate that in addition to low body fat levels, competitive female body builders characteristically possess high absolute levels of muscle mass. Additionally, somatographic analysis revealed that body segment dimensions were, on the average, 5 to 15 percent higher in the body builders in comparison to Behnke's reference woman.

P.S. Freedson
Department of Exercise Science
University of Massachusetts
Amherst, Massachusetts 01003

April 26, 1982
11:30 a.m.

A STUDY OF THE RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND OSTEOPOROSIS IN POST-MENOPAUSAL WOMEN, Nancy Oyster, Max Morton, Sheri Linnell, Colorado State University

Osteoporosis is an accepted fact of the female's aging process. This decrease in bone mass is most often linked to a lack of estrogen, but prolonged inactivity is also known to cause atrophy in both muscle and bone. The purpose of this study was to investigate the relationships between the degree of osteoporosis and the physical activity levels of a group of post-menopausal women. Forty women between the ages of 60-69 were selected at random from women who volunteered to participate in the study. Subjects known to have taken estrogen supplements within the last five years were excluded from the sample. The possible existence of a correlation between cortical diameter and activity level was investigated using linear model analysis. Cortical diameter was measured on the second metacarpal of the non-dominant hand on a radiograph. The width of the cortex could be related to many factors in addition to activity level. Some of the more important factors also considered were height, weight, ponderal index, age, years since taking estrogen and total metacarpal diameter. The inclusion of these terms in the linear model analysis allowed for an accounting of variability as associated with variables that could not be held constant. As a result of the initial hypothesis testing, the three growth and development variables (height, weight, and the ponderal index) were found to be the least significant. Therefore, additional conditional hypothesis testing was performed on some possible combinations of the remaining variables. Those showing the most significant relationships with the cortical diameter were the activity level and the use of estrogen. The relationships investigated through the linear model analysis do not need to be independent. It is possible that combinations of these variables act to retard or enhance osteoporosis. It is also possible that a retardant variable could negate the effects of an enhancer. Therefore, since the primary concern of the investigators was the relationship between physical activity and osteoporosis, a *t*-test was run comparing the ten most active women with the ten most sedentary. The cortical diameters of the physically active women were significantly ($t = 2.77$) wider, indicating less osteoporosis. It would appear from the results of this study that physical activity, in conjunction with the other variables considered, is indeed a definite factor in the retardation of osteoporosis. However, its effects without the influence of estrogen still need investigation.

Nancy Oyster
Dept. of P.E. Colorado State Univ.
Fort Collins, CO 80523

April 26, 1982
11:45 a.m.

EFFECTS OF VELOCITY AND FREQUENCY OF MUSCLE SHORTENING ON FORCE CAPACITY. Richard A. Berger, Temple University; Arthur E. Davies, Central Bucks High School

The effects of overload training with different force intensities and repetitions on strength were studied. Treatments varied in time required to complete one repetition: 1 sec., 2.5 sec., or 4 sec., and in repetitions or total work performed: 5, 10, or 15 repetitions. High school males (N=146) were randomly assigned to one of nine treatment groups based on initial strength scores. Training was nine weeks, three times weekly. The criteria were torque measured at slow (12^o/sec), moderate (76^o/sec.), and fast (145^o/sec) velocities of muscle shortening. Of the original 146 subjects, 130 completed all the training sessions and were used in data analysis. A 3 x 3 ANOVA showed that training at the highest intensity of force (4 sec/rep) was more effective than training at lesser intensities (1 sec/rep or 2.5 sec/rep) for increasing force capacity in slow movements, and just as effective for increasing force in faster movements. No significant differences were found among levels of work: 5, 10, or 15 repetitions. It was concluded that training with maximum voluntary force (4 sec/rep) is more effective for increasing strength in relatively slow movements and just as effective for increasing strength at faster velocities than training at faster velocities (12^o sec/rep and 76^o sec/rep). The frequency of contractions (5, 10, and 15) are similarly effective for increasing strength.

Richard A. Berger
Temple University
Philadelphia, Pennsylvania 19122

April 26, 1982
12:00 noon

COMPARATIVE ANALYSIS OF THE PSYCHOPHYSIOLOGICAL CHARACTERISTICS OF THE 1980 OLYMPIC FREESTYLE AND GRECO ROMAN WRESTLING CANDIDATES.

John M. Silva III, University of North Carolina; Barry B. Shultz, State University of New York-Brockport; Robert W. Haslam, Syracuse University; Thomas P. Martin, Wittenberg University; Donald F. Murray, State University of New York-Brockport

As part of a longitudinal program of testing with elite level wrestlers, a psychophysiological model was utilized to examine the degree of psychophysiological specificity existent in the two styles of wrestling. The subjects were 83 candidates competing at the 1980 U.S. Olympic Wrestling Trials. Analysis was conducted on 54 of the athletes who had complete psychophysiological data. A psychophysiological model was hypothesized based upon previous research. The 32 variables selected included: Psychological state and trait measures, the assessment of dominant grip strength, fatigability, anaerobic endurance, aerobic capacity, submaximal exercise heart rate, ventilation, reaction time measures and a measure of dynamic balance. Discriminant function analysis indicated that the hypothesized model classified wrestlers to their appropriate style with 93.75% accuracy. The top five variables accounting for much of the predictive variance were: dominant grip strength, submaximal heart rate, confusion, state anxiety and fatigability. The Greco-Roman wrestlers had stronger grip strength, lower submaximal heart rates (adjusted for body weight), and more ability to withstand grip strength fatigue. Psychologically the Greco-Roman participants had less confusion and slightly higher levels of state anxiety. In addition to this multivariate solution, which maximized predictive classification accuracy (93.75%), significant univariate F's ($P < .10$) were found for several psychological factors. Greco-Roman wrestlers were higher in psychological vigor, more self-sufficient, more outgoing, less intelligent, and lower in regression (better psychological integration) than the Freestyle group. Based upon these results, it appears that a considerable amount of physiological similarity exists between these two groups. Greco-Roman participants, however, do appear to have some physiological superiority and exhibit a slightly more positive psychological state profile than the Freestyle group. The psychological and physiological demands placed upon athletes competing in these two styles of wrestling, while similar, do differ enough to allow for accurate group classification. Thus, some variation in training prescriptions would be advisable.

John M. Silva III
Department of Physical Education
UNC- Chapel Hill
Chapel Hill, North Carolina 27514

April 26, 1982
12:15 p.m.

CINEMATOGRAPHIC ANALYSIS OF TWO DISCRETE ARM MOVEMENTS WITH IMPLICATIONS FOR THE REACTION TIME ANALYSIS OF MOTOR PROGRAMMING.

Mark G. Fischman, The Pennsylvania State University

Motor control researchers have long been interested in factors that affect the programming of rapid, gross voluntary movements. Traditionally, the independent variables that have been manipulated include the number of connected movement parts in a response (complexity paradigm), movement extent and target size (difficulty paradigm), or some combination of the above. Effects on reaction time have been used to make inferences related to the time needed to produce a response program. Often, however, little consideration is given to biomechanical factors when selecting criterion movements for study, which may lead to erroneous interpretations of the data. The purpose of this study was to use high speed cinematography to examine selected kinematic parameters of two discrete arm movements. The starting position was the same for both movements. Subjects (N=3) were seated in front of a table upon which a two-ball apparatus was mounted. The right hand rested on the response platform; a 90 degree angle was maintained at the elbow. In Movement 1 (forward), the subject reached forward and upward 25.5 cm to contact a suspended tennis ball, while in Movement 2 (lateral), the arm moved sideward and upward the same distance to backhand a suspended tennis ball. Subjects were filmed with a high speed (200 fps) LOCAM 16 mm camera placed perpendicular to the plane of motion. Coordinate data of selected trials were extracted using a Bendix film analysis system. The data revealed that average and peak linear velocities and accelerations were much greater for the lateral movement than the forward movement despite the fact that the linear distance between starting point and target was identical in both movements. In addition, peak velocity in the forward movement occurred at ball contact and then sharply declined during follow-through. For the lateral movement, however, peak velocity occurred at a point approximately .03 sec into the follow-through. A second finding of interest was in terms of the starting impulse for each movement. The lateral movement appeared to be executed in two distinct segments, with the elbow moving outward to begin the movement, followed by a large acceleration of the lower arm as it pivoted about the elbow. The forward movement, however, appeared to proceed as one complete unit. This finding suggests that investigators who use reaction time to draw inferences about motor programming be cautioned to obtain the measurement from the limb segment that actually initiates the movement.

Mark G. Fischman
Motor Behavior Laboratory
The Pennsylvania State University
University Park, Pennsylvania 16802

April 26, 1982
1:00 p.m.

VELOCITY AND MASS EFFECTS ON RESPONSE TIMING ERROR: THE RELATIONSHIP BETWEEN IMPULSE AND TIMING ACCURACY. K.M. Newell, University of Illinois; Les G. Carlton, University of Houston; Mary J. Carlton, Rice University

This study examined the relationship between impulse and the timing accuracy of discrete responses. Two experiments were conducted using a horizontal angular displacement bar apparatus. In both experiments the criterion movement time was 200 msec with responses produced over a range of movement velocities and system masses. In Experiment 1, subjects passed through the designated movement distance while in Experiment 2, movements were terminated at the target position. Experiment 2 had the effect of including a greater proportion of the deceleration phase of the response in the timed portion of the movement. Responses were produced over four movement distances (2^o, 4^o, 8^o, 16^o) and with three weights of the horizontal bar (.63 Kg, 1.76 Kg, 3.52 Kg). This yielded a total of 12 distance - weight combinations. The results of the two experiments showed that variable timing error decreased as both movement velocity and the mass of the system to be moved increased. Besides timing errors.a number of kinetic and descriptive movement parameters were examined. Correlations based upon group means generally revealed strong relationships between a number of these variables. The correlations between the variability of force proportional to force and variable timing error, calculated on a group mean basis, ranged between .91 and .95. The ability to predict the movement time outcome of each individual trial from impulse-related parameters was considerably reduced, although the relationship between the various kinematic and kinetic parameters did strengthen as movement velocity approached maximum. Collectively, the findings show that the size of the impulse is related to movement timing error, although it is premature to argue that impulse variability is a causal agent of timing error.

K. M. Newell
Institute for Child Behavior and Dev.
University of Illinois
Urbana-Champaign, Illinois 61801

April 26, 1982
1:15 p.m.

THE EFFECTS OF INCREASING MASS ON THE VARIABILITY OF MOVEMENT AND SEGMENTAL MOVEMENT TIMES.

Connell M. Byrne, Jon P. Hunt, William S. Husak, California State University, Long Beach; Roger Simmons, California State University, San Diego

It has been proposed (Schmidt, Zelaznik, Hawkins, Frank & Quinn, 1979; Sherwood & Schmidt, 1980) that the linear and proportional relationship between force and force variability alters at approximately 65% maximum, resulting in a decrease in the proportional variability of force and movement time. It is the purpose of this investigation to ascertain whether the amount of mass and the resultant level of force will significantly change the proportional variability while movement times are as rapid as possible. It is hypothesized that increasing mass will result in slower movement times while at the same time reducing variability. Subjects are required to move a slide 60cm as fast as possible under varying mass conditions ranging from 0-25 kg. Segmental movement times are recorded to identify if, and at what phase, significant changes and modifications in movement structure occur. The analyses involve determining variability of both movement and segmental times. The predictions of Sherwood and Schmidt (1980) indicated that variability of movement times should decrease under maximum force conditions. That is, when mass is added and force exceeds 65% effort variability of movement time decreases due to the decrease in force variability. The results of the Sherwood and Schmidt work would have implications for learning theory in that working at maximal effort may produce less variability of outcome and result in accelerated learning.

Connell M. Byrne
Phys. Ed. Dept., C.S.U. Long Beach
Long Beach, Ca. 90840

April 26, 1982
1:30 p.m.

STIMULUS RESPONSE COMPATIBILITY AS A DETERMINER OF RESPONSE STRUCTURE AND TIMING ACCURACY IN OPEN AND CLOSED ENVIRONMENTS.

R. Marie Howard and Charles H. Shea, Texas A&M University

Stimulus-response compatibility (S-RC) has been shown to influence performance on a number of tasks (e.g., reaction time; Leonard, 1959). The purpose of the present study was to determine the effects of S-RC on the response structure and timing accuracy of coincident timing responses in open and closed environments. It was hypothesized that S-RC would influence responding in open but not in closed environments. That is, in open environments the subject is forced to make judgements concerning the stimulus velocity/duration while this information is redundant in closed environments. Subjects (N=48) were randomly assigned to one of four groups differentiated by the level of S-RC (high or low) and the type of environment (closed or open). The subject's task was to make a continuous horizontal right-to-left arm movement in an attempt to displace the barrier (i.e., target) at the precise moment the last light on the Bassin Stimulus Runway was illuminated. A high level of S-RC existed when the subject's arm and the light sequence moved in a right-to-left direction. A low level of S-RC existed when the light sequence moved from left-to-right and the subject's arm moved from right-to-left toward the barrier. Subjects performing in the closed environment performed a 25-trial block on each of six stimulus velocities which were varied from 67.1 to 178.8 cm/sec in 22.3 cm/sec increments with the order of presentation counterbalanced. In the open environment, subjects performed 150 trials, with the stimulus velocity randomly presented and appearing 25 times each. The results indicated that S-RC influenced coincident timing performance in the open but not the closed environment. In the open environment, the low S-RC group was generally more accurate at the faster than the slower stimulus velocities, while the high S-RC group was more accurate at the slower than the faster stimulus velocities. Indeed, the analysis of the response structure indicated similar structures in the closed environment but differing structures in the open environment. It appeared that subjects actively regulated their responses only when the S-RC was high and the stimulus velocities were unknown (i.e., open environment). In the closed environment, regardless of the level of S-RC, and in the open environment when the S-RC was low, the subjects appeared to prestructure their responses.

R. Marie Howard, Dept.of Hlth.& PE
Texas A&M University
College Station, Texas 77843

April 26, 1982
1:45 p.m.

CONSIDERATIONS OF SCIENTIFIC THEORY CONSTRUCTION AND HYPOTHESIS TESTING IN THE AREA OF SPORT AS RELIGIOUS ACTIVITY. Steven Houseworth, Southern Illinois University at Carbondale

The purpose of this study was to review and evaluate prior sociological research and research methods used in the area of Sport as Religious Activity. Sociological research into the area of professional and amateur sports has led to the definition and classification of the activities surrounding sports in terms of cultic or ritual activity. Participants and devotees of sports have consequently been categorized as religious adherents to sport. This has led to the analogy of sport as religion where such activities reflect sociological definitions of cultic or religious activity. However, it is not clear that actual sociological or social-psychological research has clearly demonstrated the sport as religion analogy to be an actual phenomenon. This paper seeks to establish patterns governing research in the area of sport as religion. Four basic foundations are provided by which the sport as religion analogy can be more correctly evaluated and researched. First, the history of sport and religion is reviewed. Second, contrasts between ancient sport and its association to religious activity and, modern trends in sport and its association to religious activity are presented. Thirdly, assumptions of prior research are evaluated for adequacy and relevance. Finally, using principles of scientific theory construction recommendations are made for future scientific sociological research into the sport as religion phenomena.

Steven Houseworth
Dept. of Physical Education
Southern Illinois Univ., Carbondale
62901

April 26, 1982
2:15 p.m.

YOUTH SPORT PARTICIPATION AND DEVIANT BEHAVIOR AMONG ELEMENTARY SCHOOL CHILDREN.

Douglas Hastad, Northern Illinois University; Jeffrey Segrave, Skidmore College; Robert Pangrazi, Arizona State University; Gene Peterson, Mesa Arizona Public Schools

The purpose of this study was to investigate the relationship between youth sport participation and deviant behavior among elementary school children. More specifically, the study attempted to: (1) compare the profile of youth sport participants and deviants on a selected group of socio-psychological variables, and (2) determine differential levels of involvement in deviant behavior between youth sport participants and nonparticipants. Although previous investigations have reported a negative relationship between deviant behavior and participation in organized programs of recreation and interscholastic sport, these studies have not pertained to children. Self-report questionnaires were administered to a sample of 381 sixth grade students from six different elementary schools within the same suburban school district. Measures of youth sport involvement were limited to active participation and seasons of participation. Deviant behavior was classified as drug related (alcohol and tobacco), school related (cheated on tests, broke school rules, etc.) and composite deviancy. The Pearsons product-moment correlation coefficient and the independent samples chi-square (X^2) technique were used for the purpose of statistical analysis ($p < .05$). Overall results indicated significant positive correlations between measures of youth sport involvement and attitude toward physical education (ATPE), concept of physical self (CPS), socioeconomic status (SES), peer status (PS), and self-concept (SC). Conversely, significant negative correlations were found between deviance and ATPE, CPS, SC, personal values, attachment to school, and delinquent associates. Findings also indicated that youth sport participants reported less deviant behavior than nonparticipants. The negative relationship between youth sport participation and deviancy obtained for girls and boys and across all social classes and for different types of deviant behavior. Results suggested that the profile of deviants was diametrically opposed to the profile of youth sport participants on a selected group of socio-psychological variables and the negative relationship previously reported between delinquent behavior and participation in interscholastic sport obtains among elementary school children.

Douglas N. Hastad
Department of Physical Education
Northern Illinois University
De Kalb, Illinois 60115

April 26, 1982
2:30 p.m.

BECOMING INVOLVED IN YOUTH BASEBALL: YOUNG PLAYERS' UNDERSTANDINGS OF A SOCIALIZATION PROCESS.

Janet C. Harris, University of North Carolina at Greensboro

Studies concerning perceived level of influence of socializing agents upon children's participation in sports have yielded low correlations between level of perceived influence and level of sport participation; furthermore, mixed results have been obtained when attempts have been made to ascertain the relative influence upon sport participation of various socializing agents (e.g., Greendorfer & Lewko, 1978; Snyder & Spreitzer, 1976). The rather tenuous results of studies such as these suggest that the factors involved in the process of socialization of children into sports are probably more numerous and more complexly interrelated than have been taken into account in such earlier work. The goal of the present study was to broaden scholarly understanding of such complexities by means of an examination of children's own conceptions of their socialization into a particular sport -- in this case, youth baseball. The players of two 11/12-year-old, predominantly male, youth baseball teams were interviewed using open-ended questions designed to elicit the players' own understandings of the ways in which they came to be involved in organized youth baseball. Suggestions such as the following were supported by the data: (a) each player generally discussed two or three socializing agents, but overall there was a greater variety of socializing agents mentioned than have been considered in previous studies; (b) players' conceptions of the processes by which such socializing agents work were more complex than notions of simple face-to-face influence of the child by the agent; and (c) in contrast to more structured studies in which socialization into sports in general has been considered, in the present loosely structured study, focused upon one sport, fathers were not frequently mentioned as being influential socializing agents, and in all cases in which fathers were specifically mentioned as being important, they were highly active themselves in either baseball or softball. In conclusion, the evidence suggests that children's understandings of the processes by which they became involved in a particular sport -- in this case, youth baseball -- are more complex than have been taken into account in previous, more highly structured studies of socialization into sports in general. Open-ended player interviews focused upon specific sports can yield finer-grained, more detailed data which can serve as a valuable resource for broadening scholarly understanding of socialization processes through which youths become involved in sports.

Janet C. Harris
School of HPERD
Univ. of N. Carolina - Greensboro
Greensboro, N.C. 27412

April 26, 1982
2:45 p.m.

SPORT PARTICIPATION AND RACIAL INTEGRATION. Donald Chu, Skidmore College; David Griffey, University of Texas

The purposes of this study included the following: 1) to assess the validity of the contact hypothesis, and 2) to evaluate the extent to which sport participation may promote positive inter-racial behavior and attitudes. Contradictory findings from previously completed research in this area indicate the need for further study. In this research, effects of the independent variables "cooperative or individual sport," "years of playing experience," "won/lost record, "minority percentage in school and on team," "sex," and "socioeconomic status" were assessed on three behavioral and three attitudinal dependent measures. Methodology. Self-report questionnaires were completed by 1,082 secondary level students attending public urban schools in northern New York. Questionnaire items were modified from the original Educational Testing Service survey. Results. Based upon the analysis performed to date, findings include - 1) Athletes are slightly more racist than non-athletes. 2) The percentage of blacks on sport teams and tenure of athlete participation are significantly related to various behavioral indicators of integration. 3) Participation on cooperative sport teams is negatively associated with wanting to have more friends of another race. 4) Winning is not always related to integration. 5) Of respondents who had participated in both sport and racial relations classes, 66% felt that sport was a more effective means of promoting integration. Conclusions. There does not appear to be some validity to the contact hypothesis. In addition, sport may be an effective instrument for the promotion of racial integration if factors such as length of exposure to members of another race, social class and quantity of members of other races on sport teams and in schools are considered.

Donald Chu
Department of P.E. and Dance
Skidmore College
Saratoga Springs, NY 12866

April 26, 1982
3:00 p.m.

HEROES AND BAD WINNERS. Lee Vander Velden, University of Maryland

The purpose was threefold: first, to identify those athletes most admired (heroes) and those not admired (bad winners); second, to ascertain the characteristics attributed to those heroes and bad winners named; and third, to determine any racial differences in the traits attributed to heroes and bad winners. A questionnaire was given to 158 undergraduate men and women, blacks and whites, at the University of Maryland and Bowie State College. Respondents were asked to identify their favorite sports performers, listing the qualities they most admired about them and to identify one or more sports performers not liked, listing those qualities not admired. The specific qualities identified were organized into twelve categories: ability, appearance, competitiveness, sportsmanship, individualism, self-confidence, public image, personality, intelligence, prejudice, tells-it-like-it-is, and miscellaneous. Both men and women selected males as heroes and bad winners; moreover, blacks chose black heroes and whites chose white heroes. Muhammed Ali generated the most interest, receiving 19 votes as a hero, but 32 votes as a bad winner. In general, heroes were admired for their ability and competitiveness--hard work and hustle--while bad winners were criticized for arrogance. Black heroes were admired more for their ability than white heroes were; conversely, white heroes were respected more for their competitiveness than were black heroes. A contrast of the traits attributed to heroes and bad winners by blacks and whites supports this racial difference in the importance of ability. Blacks admired ability more than whites did, while whites valued competitiveness more than did blacks. Both blacks and whites considered arrogance a negative attribute for any athlete, but the whites also equated poor sportsmanship and a lack of competitiveness with bad winners. In summary, blacks and whites seem to look at sports heroes differently, a finding consistent with other clashes of culture such as the contrast between the city (black) and country (white) styles of play in basketball and the increase in the flaunting and taunting behavior in organized sports.

Lee Vander Velden
Department of Physical Education
University of Maryland
College Park, Maryland 20742

April 26, 1982
3:15 p.m.

THE RELATIONSHIP BETWEEN COHESION AND TEAM SUCCESS AMONG WOMEN'S JUNIOR COLLEGE VARSITY BASKETBALL TEAMS.

Joel Thirer, Southern Illinois University at Carbondale; Barbara A. Spieth, Lincoln Trail College, Robinson, IL

The purpose of this study was to determine the relationship between player cohesion and team success as measured by the resulting won - loss records of women's Junior College (JUCO) intercollegiate basketball teams. Previous research has indicated that cohesion is a positive influencing criterion in performance outcome. However, very rarely were female athletes studied, thereby making previous findings inconclusive as far as this variable is concerned. The major hypothesis of this study was that there would be a relationship between team cohesion and winning percentage, or more specifically, the higher the measured level of cohesion, the greater the winning percentage would be. Twenty-three of the 38 basketball teams which comprise Region IV of the NJCAA participated in the study, with 225 subjects returning the questionnaire via their respective coaches. The instrument utilized to determine cohesion was the Sports Cohesiveness Questionnaire (Martens & Peterson, 1971). Data were collected during the course of the 1979-80 women's JUCO basketball season. A stepwise multiple regression analysis was used to determine the most significant sport cohesion variables on winning percentage. It was found that the "teamwork" variable was the best predictor of success ($p < .05$). A standard regression analysis showed similar results, with variables of "teamwork" and "friendship" being associated with winning teams, and variables of "affiliation" and "belonging" being associated with losing teams. In general, the data from the present study do suggest a positive relationship between cohesion and a better percentage of wins for women's JUCO basketball teams.

Joel Thirer
Department of Physical Education
Southern Illinois University
Carbondale, Illinois 62901

April 26, 1982
3:30 p.m.

CONTROL PROCESSES AND PHASING CHARACTERISTICS OF RAPID TWO-HANDED MOVEMENTS. John T. Quinn, Jr., Institute of Child Behavior and Development, University of Illinois, Champaign

According to the generalized motor program hypothesis (Schmidt, 1975),two movements varying on some kinematic dimension (e.g., movement velocity) may be controlled by a common motor program that produces each movement via modification of a parameter value (e.g., in the "gain" of movement forces). Quinn and Sherwood (under review) reported that the time requirement for re-parameterization of a movement (120 msec) was considerably shorter than the time requirement for re-programming a movement (200 msec). Would similar results be found if two hands were employed? The present set of experiments determined if there were any systematic differences in the EMG patterns that underlie two-handed movement production. Six subjects performed bi-phasic arm-extension movements through the horizontal plane in which movement of the upper arm preceded movement of the lower arm. EMG recordings were taken from the biceps and triceps brachii, the pectoralis major, and the latissimus dorsi. On 30% of the self-initiated, bi-phasic movements, a signal light would be illuminated, indicating that the ongoing movement should be either re-programmed or re-parameterized. Average EMG latencies were 212 and 122 msec,respectively. More importantly, however, the timing and phasing characteristics of EMG bursts seen in 70% of the trials were maintained during 43-parameterization but dramatically altered during reprogramming--results strongly supporting the generalized motor-program hypothesis.

John T. Quinn, Jr.
Institute for Child Behavior &
Development, University of Illinois
Champaign, Illinois 61820

April 27, 1982
8:00 a.m.

BIASING EFFECTS IN THE PRODUCTION OF WELL-LEARNED MOVEMENTS.

Les G. Carlton, University of Houston

One of the most consistent findings in short-term motor memory research has been the interfering effects of interpolated movements on the retention of movement information. These interfering effects often take the form of a response bias. The biasing effects are quite general and have been demonstrated for distance, position and force production tasks. The present experiment examines the effect of movement perturbations on the recall of subsequent movements when the criterion response is well learned. Previous biasing effects have typically been demonstrated using a short-term memory paradigm. The subjects'task was to learn to move a horizontal arm bar a distance of 70^{o} in 700 msec. After initial practice at the task,subjects performed a series of trials in which an accelerating or decelerating perturbation was interjected into the ongoing movement on 20% of the trials. Eight different perturbation levels were used for both the acceleration and deceleration force types, yielding a total of 16 conditions. Subjects were instructed to compensate for the disturbance and complete the movement, stopping on the target in 700 msec. The primary measures of interest were the movement times for the trials immediately following the perturbation trials and the kinematic properties of these responses. The results indicated that the response perturbation caused a pronounced biasing effect which was related to the direction and magnitude of the force disturbance. The trials following perturbations also tended to be more variable than control trials. In general, the results indicated that well-learned timing responses are also subject to biasing and variability effects much like responses recalled from short-term memory. These findings also suggest that the interfering effects occur at a peripheral rather than a central level.

Les G. Carlton
Department of HPER
University of Houston
Houston, Texas 77004

April 27, 1982
8:15 a.m.

SEARCH IN SHORT-TERM MOTOR MEMORY. Georgann Lucariello and Tonya Toole, Florida State University

Memory scanning, or the Sternberg (1966) procedure, has become the primary procedure for investigating retrieval from short-term memory. Sternberg (1966, 1969) has found that memory search was not only serial, but exhaustive, for verbal material. The purpose of this study was to investigate the search process involved in a motor task within a short-term motor memory paradigm. Two questions were being asked: (1) is search serial or parallel and (2) is search self-terminating or exhaustive? If a parallel search process is assumed, then with each additional item in a memory set, RT should not increase. If search is a serial process, then RT would increase with each additional item in memory. Serial search time is dependent on the position of the item in the set, if the item is in the set. If search is self-terminating, then the S will stop searching, on the average, half-way through the list when the item is in the set. Contrary to this, if search is exhaustive, the RT will be the same whether the item is in the list or not. Ten right-handed undergraduates and graduates from F.S.U. volunteered to serve as subjects. The study was a 3 x 2 (memory set x response) within-subject design. The levels of the first factor were a series of 1, 3, or 5 movements. The second factor levels were yes or no responses. RT was the dependent variable. Ss were required to move their arm along a linear positioning apparatus in a series of rapid movements. Upon completion of presentation of the memory set, Ss were presented with a search movement (1 movement), which was either the same distance as one of the memory set movements (a yes response) or was a different length (a no response). When the stop at the end of the movement was contacted, a clock started. Ss stopped the clock by lifting either the index or middle finger of the left hand off a microswitch, indicating a yes or no response. To avoid trace decay, presentation of the total memory set was completed in less than 15 seconds. For analysis, only the correct responses were used. A 3 x 2 ANOVA yielded non-significant main and interaction effects. One-way ANOVAs were performed on the yes RT responses and the no RT responses, for the 3 different memory sets, yielding non-significant F ratios. It would seem from the results of this study, search in motor short-term memory was a parallel, exhaustive scan. The results were also discussed in relation to verbal memory findings.

Georgann Lucariello
Movement Science and Physical Educa.
Florida State University
Tallahassee, Florida 32306

April 27, 1982
8:30 a.m.

AGE-RELATED CHANGES IN PROCESSES SUBSERVING RESPONSE ORGANIZATION.

Timothy D. Lee and Jerry R. Thomas, Louisiana State University, Baton Rouge

Males from three levels (7, 11, and 22 years) were used to assess the processes underlying the organization of planned ballistic responses. Specifically, the present study addresses the following two questions: a) are there developmental differences in the rate of acquisition of a speeded complex movement? and b) once learned, are there age-related differences with respect to the consistency underlying response organization? To answer these questions, subjects performed 15 trials on each of three tasks: a) a simple hand lift in reaction to a visual signal, b) a complex response without RT and c) the complex response initiated upon signal onset. A comparison of simple with complex RTs revealed age and task main effects; however, the lack of a meaningful interaction suggests that by school age, mature central processes are utilized in accessing a movement plan. Response acquisition (as revealed by complex response MTs across trial blocks) and response consistency (as revealed by intraindividual MT standard deviations) showed clear development trends, asymptoting by the second block (of 3 trials) for the adults and by the fifth block for the 7-yr-olds. The data for the 11-yr-olds, though, is particularly interesting--while mean MT did not level off until after block 3, intraindividual standard deviations asymptoted after the first block of trials. Further, while mean MT differences between 11-yr-olds and adults existed throughout, no differences in response consistency were found following the first block of trials. These data are discussed as reflecting two important aspects regarding development differences in response organization. First, there appears to be a discrepancy between the development of speeded movement performance and the processes subserving response organization. Second, by 11 years the qualitative nature of plans underlying response production are at adult level.

Timothy D. Lee
School of HPERD
Louisiana State University
Baton Rouge, LA 70803

April 27, 1982
8:45 a.m.

THE STRESS OF ADVENTURE ACTIVITIES AND HOW ITS EFFECTS ARE INFLUENCED BY PHYSICAL FITNESS AND PERSONALITY.

Camille J. Bunting, Texas A&M University

The pupose of this study was to determine the difference in urinary epinephrine (E) and norepinephrine (NE) excretion between physically fit and non-fit, introverted and extraverted males, when exposed to the emotional and physical stress of rock climbing. A secondary purpose was to compare these results to measurements of perceived anxiety. Twelve college age males were volunteers for this investigation. Six fit Ss having a $\dot{V}O_2$ max of 52 ml/kg or above and six non-fit Ss having a $\dot{V}O_2$ max of 42 ml/kg or below were selected. Rock climbing and rappelling served as the representative stressful adventure activities, and all Ss were required to have had no prior experience with these activities. Urine was collected at the same time each day for four different three-hour sampling periods, and the Spielberger State Anxiety Inventory (SSAI) was administered at the end of each sampling period. These sampling periods consisted of a baseline period, an anticipatory period, and two periods of actual climbing and rappelling. The results indicated a significant difference ($p < .05$) between the fit and non-fit Ss in NE excretion, but no difference in E excretion. With the Ss classified as introverts and extraverts, results indicated a significant difference ($p < .01$) in E excretion between the groups, but no difference in NE excretion. Results from the SSAI indicated no differences between groups, but did show the anticipatory session to produce the highest level of perceived anxiety. Evidence indicates that some individuals are better equipped physiologically and/or psychologically to manage stress than are others. With many outdoor adventure programs being conducted with the inverted-U hypothesis of stress and performance as a foundational principle, it would be appropriate for such programs to assess the fitness level and personality of each participant.

Camille J. Bunting
Dept. of Health and Physical Educ.
Texas A&M University
College Station, Texas 77843

April 27, 1982
9:15 a.m.

LEVEL OF EXPERIENCE IN OUTDOOR RECREATIONAL RISK ACTIVITIES.

Mildred J. Little, Camille J. Bunting, Texas A&M University

The purpose of this study was to examine the level of experience of male and female college students in 11 different outdoor recreational activities usually termed as risk activities. The study also attempted to determine if one's environment or sex had an effect on experience. A questionnaire was administered to 869 Texas A&M University students (486 males and 383 females). Experience was rated by means of five possible levels: no experience, one experience, limited experience, frequent experience, and extensive experience. Environment was classified by means of four possible levels: rural, small town, medium size, and large. The 11 risk activities were: caving, downhill skiing, hang gliding, hot air ballooning, hot dogging, motorcycling, rock climbing, scuba, sky diving, surfing, and whitewater canoeing. A descriptive analysis revealed that hot air ballooning, hang gliding and sky diving were participated in the least and that motorcycling and downhill skiing were participated in the most frequently. Only 29% of the students had no experience in motorcycling while 97.70% had no experience in hot air ballooning. The Chi Square test for independence was run to determine the relationship of sex upon the level of experience. Significant Chi Squares ($p > .05$) were found for caving, downhill skiing, motorcycling, scuba, surfing, and whitewater canoeing. No significant Chi Squares ($p > .05$) were found when the relationship of environment upon the level of experience was analyzed.

Mildred J. Little
Department of Health & Physical Ed.
Texas A&M University
College Station, TX 77843

April 27, 1982
9:30 a.m.

A DESCRIPTIVE STUDY OF HOUSTON SPORT DIVERS AND HOW THEY ARE INTRODUCED TO SCUBA.

Margaret O'Reilly, Texas A & M University; Allan Mills, Texas A & M University; Louis Hodges, Texas A. & M University

A study of Houston sport divers was completed during January and February of 1981. A telephone survey was used to collect data for this study. One hundred and fifty divers were sampled from a list of Houston dive club members. The response rate was 99%. Objectives of the study were to determine descriptive and behavioral characteristics of Houston divers and the different ways in which they initially began participation in the sport of scuba diving. The principal focus of the analysis was upon what first attracted divers to diving and who physically introduced them to diving for the first time. A thorough literature review indicated no previous research had been done on this. Television programs on diving were reported by a relatively large proportion of the divers as the thing that first got them interested in the sport. Others indicated it was a love of water activities. A variety of different kinds of acquaintances and social groups were found to be instrumental in introducing divers to diving, but friendship group was the major introductory influence for female divers. Most divers reported changing their circle of friends in different ways after beginning to dive. Divers were profiled using descriptive and behavioral characteristics. Several of these characteristics were found to be associated with frequency of participation in diving. Differences and similarities in diver behavior were identified for underwater as opposed to topside settings. A listing of 43 recreation activities and sports that divers had participated in either prior to or continuously since beginning to dive was also generated. Characteristics of most preferred dive sites were also identified. A general conclusion of this study was that a person's exposure to the media and participation in other water sports may contribute substantially to choices to participate in activities such as SCUBA diving. Results of this study have implications for water resources agency planning to accommodate diver use, as well as for diving certification agency marketing strategy.

Margaret B. O'Reilly
Department of Recreation and Parks
Texas A & M University
College Station, Texas 77843

April 27, 1982
9:45 a.m.

THE EFFECT OF AN OUTDOOR EXPERIENTIAL ADVENTURE PROGRAM ON THE DEVELOPMENT OF DYNAMIC BALANCE AND SPATIAL VEERING FOR THE VISUALLY IMPAIRED ADOLESCENT.

Bonnie Black, Central Michigan University, Mt. Pleasant

The purpose of this study was to observe the effect of an outdoor experiential adventure program on the development of dynamic balance and spatial veering (ability to walk a straight line) in the congenitally visually impaired adolescent. It was hypothesized that dynamic balance and spatial veering in congenitally visually impaired adolescent boys and girls, ranging in age from 158 to 211 months, following participation in a fifty-hour residential program of outdoor experiential adventure activities, are significantly better than dynamic balance and spatial veering in congenitally visually impaired adolescent boys and girls, ranging in age from 147 to 221 months, following participation in a fifty-hour program of traditional physical education activities and mobility training, while in a residential setting. A modified, nonequivalent control group, quasi-experimental design was used. Data were analyzed by independent t test, analysis of covariance and Pearson product-moment correlation coefficient. The 0.05 level of significance was utilized. There was no significant difference between the comparison and the experiential group on the dynamic balance or spatial veering pretests. The experiential group had a statistically significant higher adjusted mean dynamic balance posttest score than the comparison group, when the pretest score was used as the covariate in the adjustment process of the analysis of covariance. The null hypothesis was rejected, showing that there was a difference in dynamic balance in the experiential group which indicated improvement. The experiential group had a statistically significant reduction in spatial veering scores from the pretest to the posttest when compared to the comparison group. The null hypothesis was rejected, indicating that there was improvement in spatial veering in the experiential group. The correlation between the pretest scores for dynamic balance and spatial veering was 0.167. The tests were not significantly related in a statistical sense and appeared to be measuring different attributes.

Bonnie C. Black
Department of Physical Education
Central Michigan University
Mount Pleasant, Michigan 48858

April 27, 1982
10:00 a.m.

AN EXPLORATION OF THE FLOW EXPERIENCE AMONG SELECTED COLLEGIATE ATHLETES. Jan Progen, University of North Carolina at Greensboro

The purpose of this study was to explore Csikszentmihalyi's flow theory in sport as perceived by collegiate athletes. The Sport Flow Q Sort developed by Progen, and revised to more comprehensively represent flow theory constructs, generated the data. The Q sort contained 80 items and employed a forced, normal distribution of items. Responses were obtained from 358 men and women athletes representing 39 teams and 22 institutions of higher education. Athletes participated in the following sports: baseball, basketball, field hockey, football, golf, gymnastics, lacrosse, softball, tennis, track, and volleyball. The findings of the investigation were as follows: 1. Flow was overwhelmingly perceived to be most descriptive of the athletes' sport experiences. Worry-anxiety$_w$ was moderately associated with intercollegiate athletes. Feelings of boredom-anxiety$_b$ were not characteristic of their experiences. Each of the flow elements was more descriptive of the athletes' feelings than either worry or boredom. They ranked as follows: centering of attention, control, merging of action and awareness autotelic nature, clarity, and loss of ego. 2. Moderate to high Kendall tau correlation coefficients suggested significant relationships among the flow experiential states and substantiated Csikszentmihalyi's theoretical propositions. A high interdependence among the flow elements was not evidenced. 3. Significant one-way ANOVAs were obtained for the flow experiential states and elements when sport affiliation was considered. However, few differences were found between sport pair comparisons using Scheffé tests. No statistically significant differences were found in t-test comparisons of men and women athletes. 4. Test-retest data from a subsample of 40 athletes using Kendall tau correlation coefficients supported the reliability of the Sport Flow Q Sort. In summary, the findings confirmed Csikszentmihalyi's flow model as descriptive of intercollegiate athletes' sport experiences. It appears that athletes' experiences in intercollegiate sport are more similar than different regardless of sport affiliation or gender.

Dr. Janice L. Progen
University of North Carolina at
Greensboro
Greensboro, N.C. 27412

April 27, 1982
10:30 a.m.

THE RELATIONSHIP AMONG SIX INFORMATION PROCESSING ATTRIBUTES AND MALE AND FEMALE TENNIS PLAYERS OF VARYING SKILL LEVELS.

Noel Blundell, University of Tennessee, Knoxville, Tennessee

The purpose of this study was to determine if: (a) there were differences in field dependence/independence, perceptual speed, spatial relations, reaction time (RT), complex reaction time (CRT) and movement time (MT) among tennis players of varying skill levels, (b) there were gender differences, and (c) there were an interaction effect of gender and skill. Participants were 48 subjects, 18-23 years, consisting of an equal number (n=8) of males and females categorized as beginning, intermediate, or championship level players, according to the criteria outlined in the National Tennis Rating Program. Field dependence/independence was determined by the average absolute error (in degrees) of 18 trials of the Rod and Frame test, while perceptual speed was determined by the mean time (to the nearest 0.1 second) for the Embedded Figures Test, Form A. The ability to determine spatial relationships was measured by a score (0-60) on the spatial relations subtest, Form T, of the Differential Aptitudes Test. Simple and complex reaction time and movement time were measured by using a Marietta Instruments Co. reaction and movement time device. A 2 x 3, gender by skill level, MANOVA was used to analyze the data. Wilks' Criterion ($p < .05$) was utilized to evaluate the multivariate F and Neuman-Keuls post hoc tests and utility indices were utilized on the resultant univariate ANOVA's where appropriate. The data analysis revealed that:

(a) The intermediate and championship tennis players were significantly faster in respect of RT, CRT, and MT than the beginning players.
(b) Male players had faster MT than female players.
(c) Female beginning players had significantly slower RT than both intermediate and championship level female players.
(d) Significant correlations were obtained among the perceptual variables.
(e) Skill level accounted for 8.4% of the variability in RT, 17.5% in MT, and 17.1% in CRT; and gender accounted for 18% of the variability in MT.

This study indicated that the information processing components of translation and effection (as measured by RT, CRT, MT) were different across skill levels.

Noel Blundell
Division of Physical Education
University of Tennessee
Knoxville, TN 37996-2700

April 27, 1982
10:45 a.m.

THE EFFECT OF AGE, SEX AND PARTICIPATION IN AGE GROUP ATHLETICS ON THE DEVELOPMENT OF TRUST IN CHILDREN.

C. Eric Gronbech, HPER&A, Chicago State University, Illinois; Mary Clark, Matteson School, Illinois

Trust is the reliance of resting of the mind on the integrity, justice and friendship of another person. The willingness to trust other people is a desirable trait for harmonious existence in our society and a necessity for participation in physical activity and competitive athletics. The development of trust has always been an objective of physical educators and coaches in the difficult-to-measure affective domain. It was the purpose of this study to investigate the development of trust in children relative to age, sex and participation in organized age group athletics. One hundred and twenty boys (N=60) and girls (N=60), eight (N=20), ten (N=20), and twelve (N=20) years of age, served as subjects. Each subject was tested in the "trust fall", the first known use of this behavioral test for research purposes. The task required each subject to: stand on a release board located on an adjustable platform at shoulder height, place his/her arms across their chest, close the eyes and fall backward (keeping their body stiff) into the arms of six of the peers. A chronometric device was constructed to time the delay between a subject receiving the test instructions and command "go" from an audio tape, and the initiation of the fall from the release board. Elapsed time was measured to the nearest one-hundreth of a second. Computation of a three (age) by two (sex) by two (participation) ANOVA resulted in the findings that males were more trusting than females, and participants were more trusting than non-participants ($P < .05$). An orthogonal polynomial aanalysis of the age effect indicated that ninety-five percent of the variability in trust, brought about by increasing age from eight to twelve, could be predicted by a linear regression equation.

C. Eric Gronbech
Chicago State University - HPER& A
95th St. at King Drive - G-216
Chicago, IL 60628

April 27, 1982
11:00 a.m.

BELIEFS AND ATTITUDES OF MALES AND FEMALES TOWARD REGULAR WEIGHTLIFTING.

Patricia Riddle, University of Nebraska, Lincoln

The purpose of this study was to determine the beliefs which help predict the intention of males and females to participate in regular weightlifting. Fishbein's social-psychological model was used to ascertain beliefs, attitudes and social support of male and female regular lifters and of female intenders and nonintenders. Beliefs regarding regular weightlifting were elicited, with the most frequently mentioned beliefs used to construct the final instrument given to 196 university students. Intenders showed differences by sex in beliefs and evaluations of the consequences but showed no difference in social support. Females ($N=47$) were more likely ($p < .05$) than males ($N=39$) to believe weightlifting would help them lose body fat and weight, increase muscle strength, improve physical health and appearance and make them feel energetic. Females evaluated losing body fat and weight more positively than did males. Neither sex believed they would lose flexibility, and males evaluated flexibility loss more negatively than did females. A comparison of the beliefs of female intenders and nonintenders revealed significant differences in 11 of 14 beliefs. In general, intenders were more likely to believe in the positive consequences of lifting (increased physical and mental health, increased muscle strength and physical endurance, and loss of body fat) whereas nonintenders believed more strongly in negative aspects (taking too much time). Also, intenders felt social support from referents (mother, father, physician, friend) whereas nonintenders indicated no social support. Intenders thought boyfriend would disapprove most whereas nonintenders thought mother would disapprove most. Intenders appeared to not care what others thought regarding their weightlifting. If one is interested in encouraging more people to participate in weightlifting, programs must be developed to change the beliefs and social support system of nonweightlifters, particularly women, to more closely parallel those of intenders.

Patricia Riddle
206 Coliseum, UNL
Lincoln, Nebraska 68588

April 27, 1982
11:15 a.m.

POST-EXERCISE ETHANOL CLEARANCE IN SWIM TRAINED ALCOHOLIC RATS.

C. Murray Ardies, Carlton K. Erickson, and Roger P. Farrar, The University of Texas at Austin

We measured the rate of ethanol clearance from the blood of four swim trained alcoholic rats during resting conditions. Two days later we measured clearance rates on the same animals immediately following their two-hour swim. A 2.5 g/kg dose of ethanol as a 20% solution was injected i.p., and 50 μl. samples of blood were obtained from the tip of the tail every hour for six hours. Blood ethanol levels were determined by the head space gas chromatograph technique, and rates of ethanol clearance were calculated by the Widmark method. Results indicate that the ethanol was cleared from the blood at a 28% greater rate during the recovery period than during the rested state. The enhanced ethanol clearance after exercise would not be due to increased body temperature since heat loss during swimming is efficient enough to preclude a large rise in body temperature. The increase in the rate of ethanol clearance, however, may be due to a greater availability of cytoplasmic NAD^+ resulting from an increase in lactate/pyruvate ratios in the liver during the recovery process.

C. Murray Ardies
Dept. Physical and Health Education
University of Texas at Austin
Austin, Texas 78712

April 27, 1982
11:45 a.m.

EXERCISE HEART RATE AND SKIN TEMPERATURE RESPONSES TO COLD WIND.

Charles E. Riggs, Dewayne J. Johnson, Robert Kilgore, The Florida State University; Larry W. Titlow, Northern Kentucky University

The purpose of this study was to investigate the effects of a cold wind blowing in the face on exercise heart rate and skin temperature responses. Ten male volunteer subjects, ranging in age from 25 to 51 years, participated in the study. Each subject performed the same workbout twice, once with a 10° C wind blowing in the face at 6.5 m/sec. and once without the cold wind. The workbout consisted of pedaling a bicycle ergometer at 50 rpm in five min. stages followed by five min. recovery periods. The first work stage was at 0 W intensity. The intensity was increased 25 W each stage until reaching 125 W in stage six. After five min. at 125 W, intensity was progressively increased until the subject achieved maximum. Heart rate was continually monitored using a standard three lead ECG hook-up. Skin temperature responses were obtained by attaching thermisters: 1) above the bridge on the forehead; 2) on the tip of the nose; and 3) in the center of the manubrium. Values were recorded at the end of each exercise stage and each recovery stage. Factorial multivariate analysis of variance was used to test for significant differences between treatments and between young (under 30 years) and old (over 35 years) subjects. Factorial MANOVA yielded the following results: 1) overall group effect for exercise HR, $F_{7,10}=1.80$ with $p(F)=.1918$; 2) overall treatment effect for exercise HR, $F_{7,10}=.29$ with $p(F)=.9431$; and 3) group X treatment interaction for exercise HR, $F_{7,10}=.69$ with $p(F)=.6800$. Other results included no significant overall group or group X treatment interactions for any of the three skin temperature response sites, but significant overall treatment effects for the three skin temperature response sites ($p < .01$). Within the limitations of the study it was concluded that a cold wind blowing in the face has no effect upon exercise heart rate. It was also concluded that there are no differences between young and old subjects in exercise heart rate between treatments. The cold wind did have a significant effect upon skin temperature at the three sites measured.

Charles E. Riggs
Human Performance Lab, Montgomery G.
The Florida State University
Tallahassee, Florida 32306

April 27, 1982
12:00 noon

COMPARISON OF ACTIVITY PATTERN DATA FOR 2nd, 5th, AND 7th GRADE MALES.

A. E. Pels, D. L. Geenen, C. Kuntzleman, D. Dodson, B. Kuntzleman, and T. B. Gilliam, Department of Physical Education, The University of Michigan; and Fitness Finders, Inc., Spring Arbor, MI

The purpose of this study was to compare activity pattern data for 2nd [(n=8), ($\bar{X}$ age = 92 months)], 5th [(n=8), ($\bar{X}$ age = 133 months)], and 7th [(n=6), ($\bar{X}$ age = 235 months)] grade male children. Activity pattern data were obtained from a 12-hr continuous EKG recording using a Holter monitoring device. The 12-hr EKG recording was replayed,and a Cromemco Systems Three micro-computer was programmed to count the R-R intervals and thus obtain minute-by-minute heart rates. The activity pattern data were then divided into 10 beat · min^{-1} intervals for analysis purposes, i.e.,80-89, 90-99, etc. Height, weight, and four skinfold measurements (subscapular, suprailiac, triceps, and abdomen) were obtained. The four skinfolds were then summed (SSF). Height, weight, and SSF were significantly ($p \leq 0.05$) different between the three grades,which would be expected. Analysis of the amount of time, during the 12-hr period, that each group spent at HIGH heart rates ($\geq$ 160 beats · min^{-1}) revealed non-significant ($p > 0.05$) differences between the three grade levels. The absolute time at HIGH heart rates was small for each of the three groups being 11.1 ± 3.0, 11.0 ± 2.7, and 6.1 ± 3.7 min, ($\bar{X}$ ± S.E.) for the 2nd, 5th and 7th grades, respectively. The time spent at MODERATE (120 - 159 beats · min^{-1}) and LOW (120 beats · min^{-1}P)heart rates was also not significantly ($p > 0.05$) different between the three grade levels. It was concluded that no differences exist between 2nd, 5th, and 7th grade male children in respect to their activity patterns as quantified through the use of minute-by-minute heart rates. It was also concluded that none of the groups spent appreciable time at HIGH heart rates, a level that would result in a training effect and increased cardiovascular fitness. It seems, therefore, that 2nd, 5th, and 7th grade males are not active enough to produce cardiovascular fitness,which is contrary to what has been purported previously.

Supported by a grant from the W.K. Kellogg Foundation.

Albert E. Pels III
Dept. of Phys. Ed., 401 Washtenaw
Ann Arbor, MI 48109

April 27, 1982
12:15 p.m.

BODY COMPOSITION, ENERGY CONSUMPTION AND LIPOGENIC ENZYME ACTIVITY AS AFFECTED BY CHRONIC EXERCISE AND RETIREMENT FROM CHRONIC EXERCISE IN THE ADULT HAMSTER.

Robert J. Moffatt, Western Washington University, and Katarina T. Borer, The University of Michigan

The purpose of this study was to examine the effect of chronic exercise and retirement from exercise on body composition, body weight, caloric consumption and lipogenic enzyme activity. Forty-eight adult female golden hamsters weighing between 120-130 grams were randomly allotted to one of eight groups in a 2 X 4 experimental design. The conditions were activity (exercised or sedentary) and days (7 and 28 of exercise and 7 and 28 of retirement). Each group consisted of six animals which were either exercised, then retired or sedentary controls. Exercise was elicited by voluntary running on a free turning, horizontal activity disc. After day 28, exercise was terminated and animals began a period of retirement lasting for an additional 28 days. Food consumption and body weight were measured every two days. Two groups of animals (exercised or exercised retired and a sedentary control) were sacrificed at day 7 and 28 of exercise and day 7 and 28 of retirement for determination of body composition (derived from whole carcass homogenates) and hepatic fatty acid synthetase and malic enzyme activity. Results showed that exercised hamsters decreased body fat by 44%. This change appeared to be compensated for almost entirely by an increase in lean body mass. Voluntary running resulted in a 15% increase in caloric consumption after day 7 of exercise, and this effect persisted for about 6 days after retirement. By day 28 of exercise, lipogenic enzyme activity was also increased and remained elevated until day 7 of retirement. Retirement from exercise resulted in a 45% increase in body fat by day 7 and a further 25% increase by day 28 of retirement. No significant changes were observed across days for sedentary control animals. The results of this study suggest that chronic physical exercise reduces body fat whereas abrupt retirement causes a rapid deposition of body fat. This may be attributable to a delayed ability to adapt to reduced energy expenditure during the early phase of retirement.

Robert J. Moffatt
Dept. of Physical Education
Western Washington University
Bellingham, Washington 98225

April 27, 1982
12:30 p.m.

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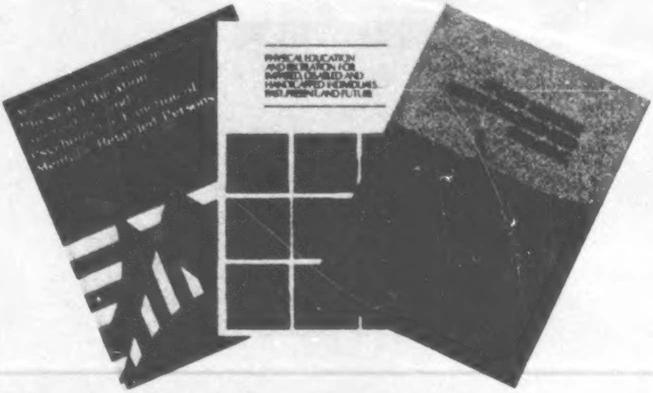
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